The United States MILLER

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A Famine Imminent in Russia.

Russian authorities have evidently endeavored to conceal the gloomy condition of affairs in that Empire, but the necessities of the people throws light on the subject which will cause a considerable commotion in the grain markets of the world. To a certain extent, Western Europeans have expected there would be short crops in Russia, but still sufficient to meet the wants of its inhabitants during the coming winter, but now it is a well assured fact that there is a great deficiency which must be made up by importing grain or flour, the bulk of which must be obtained from America. On this subject the *London Standard*, of November 3, says:

Already several cargoes of wheat have arrived from America, and the Odessa papers report the importation of wool from South Africa. Day by day the scantiness of the grain crop is becoming more and more evident, until it is certain that this year Russia, instead of contributing, as she has hitherto done, largely to the food supplies of Europe, will, to a considerable extent, be dependent on the surplus wheat, barley and rye harvests of other parts of the world. This state of affairs, happily unique in the annals of modern Russia, has arisen out of a variety of causes. Ever since the emancipation of the serfs, the tendency of the wheat-growing, and, indeed, of the agricultural area generally, has been to shift southward. The emancipation entailed serious loss on the proprietors of what is known as the Northern Agricultural Zone, and they nearly all abandoned tillage as an unprofitable occupation. On the other hand, the land owners of the more southerly region have found their revenues increasing under the altered condition of affairs, for even when they do not farm themselves they derive a good income from letting their land to peasants. But with the increase of the wheat and other grain areas in the South, the pest of locusts has made its appearance. These insects visit Southern and Eastern Russia every year, but this summer and autumn the swarms from the Asiatic steppes and deserts have done so much damage that very early in the season the Government endeavored in various ways to mitigate the misfortune. In the district of Rasachs 5,000 men were employed gathering locusts at the rate of 18,000 lbs per day, and in the country about Odessa fourteen companies of soldiers were detailed for the work of destruction. On the Poti-Tiflis Railway the trains were obstructed by the swarms, and the verdant steppes of the Don were by July so bare of vegetation that they looked as if a fire had passed over the land. Nor was the visitation confined to the Southern Governments, for many parts of the North suffered in an almost equal degree, and even in the latitude of Moscow the air on midsummer day was blackened by a cloud of the devouring insects passing over the city. In Russia, however, as in the Western States of America, the locust is irrepressible; hence the officials found all their efforts thwarted at every turn by this winged consumer of green things. But misfortunes never come singly, and an ally in destruction soon appeared to reinforce the locust and to make heavier still the peasants' already ample weight of misery.

This second plague of the wheat fields was the beetle known to the rural population of Kherson as "courzka," and to entomologists as *Anisoplia Austriaca*. This insect first appeared five years ago in the Melitopel district, but there is nothing known as to how and whence it came, as it had never been heard of in any other part of Russia, or in the bordering countries. It is a beetle of leisurely habits. From egg to adult it takes two years to complete its growth, but it is vigorous in proprotion to the time it occupies in completing its transformations, for at the close of its second summer it appears on the ground in such numbers that as many as ten bushels have been collected off one acre of wheat land. They fly from ear to ear, and never quit their prey until it is devoured. A field, or Commune, or Government disposed of, the courzka takes its flight to another, and so swift on the wing is this "shard borne beetle" that it removes from one ruined province to another doomed one with almost incredible speed, and so sharp are its madibles that the unhappy peasant is never left long in suspense as to the fate of his fields. Last summer a mass of these beetles were discovered in the water near Ochakoff so dense that it was difficult to pull a boat through them. They were generally washed on shore, but the stolid people, instead of taking prompt measures to destroy them, allowed them to remain on the strand. When at last they recognized the danger with which they were menaced, persons were sent with horses and carts to remove them. But it was too late. About three-fourths of the insects had recovered strength and flown inland to form a new generation in that district, and spread, like the Colorado beetle of the New World, over the surrounding country. The British Vice-Consul at Nicolaieff, in reporting the occurrence to the Foreign Office, predicted that, unless efficient means were adopted in time, all agricultural Russia would become the prey of these insects, causing privations hitherto unknown in the country. What he prohesied has now become more or less a reality, though it is difficult to see what possible means can be employed to prevent the spread and increase of this most destructive of the coleopters, unless by burning the soil, which would, of course, injure its fertility. The case is, for English consumers, one of very grave concern. It is more than likely, even were the insect introduced, that it could not survive in the British climate. But its direct effect on the grain supply of Russia has for England more than most other countries a high and immediate interest.

The value of the Russian cereal exports is about 10,000,000 sterling per annum, and of this the greatest portion comes to Great Britain. In 1874 this country took 13,766,000 cwt. of this grain, and four years later, 21,409,000 cwt., of the value of £8,334,000. If Russia is at present importing grain for her own use, it is self-evident that this deficiency must be supplied from other sources. Of course, we need have no uneasiness on that score, for America, Australia and Upper India are quite able to more than provide the quantity which Russia can no longer send abroad. But in spite of this we may have to pay more than usual for our breadstuffs, though, as the addition to the price, owing to the abundant American supply, need not be great, our home growers will have more reason to rejoice than the consumers to repine at the enhanced cost. A more serious question is the loss of trade with Russia which this scarcity must necessitate. Our trade with Russia amounts, so far as the import of British manufactures is concerned, to something under seven millions, whilst, if we exclude grain, the other goods received by us from the Northern Empire are not valued at over eight millions. It is therefore undoubted that we must suffer directly and indirectly should the expected famine not be speedily tided over, for if the peasant has no grain to sell he has no money to spend. But to Russia herself the loss will be most severe. The country is not at present in a healthy condition. Her finances since the last war have been disordered, the people are heavily taxed, and a large class in the cities are notoriously discontented with the Government, which, rightly or wrongly, they blame for all their sufferings. A famine, of course, will not improve matters. An agricultural people not more than able to pay their way in good seasons will be almost ruined by one like that through the bitterness of which they have yet to pass. This state of matters will not fail to be taken advantage of by the Nihilist conspirators in the cities who have hitherto been able to influence but slightly the unimaginative loyal, and prosperous "Moujiks." The coming famine may, however, have the effect of hastening the construction of railways over the Ourals, in order to tap the hitherto all but untouched agricultural wealth of the Black Earth Lands of Siberia, which neither the beetle nor the locust has yet reached. At present wheat can be bought in the valleys of the Yenessi and the Obi for less than a twentieth of what it will command in Europe, and cattle find so bad a market that young calves are sold in June for 6d each. Despite the discovery of the Nordenskjold-Wiggins sea route this region, in many respects far finer than Canada or some of the Northwestern States of America, is shut out from the world. Nevertheless, to Siberia the Government must look for their supplies of food, should the present bleak prospects of European Russia not improve.

The Scrap Shop.

Every well regulated machine shop has its scrap boxes for the reception of odds and ends that have served a purpose and may serve another, and has also its scrap heap, where usefulness awaits another form through the medium of the foundry or forge. But there is occasionally to be found a shop, the principal production of which is scrap. The proprietor or foreman may have learned his trade, but he cannot teach it; he may understand the characteristics of the metals he works, but he does not know human nature; he may see the end he desires to reach on a job, but he is more or less uncertain as to the road necessary to reach it. In such a shop every tool is its own gauge; there is no permanence of form to any appliance in use in the shop. To-day it is a strap holding a blank to a wooden chuck; to-morrow it will be a knee brace built into some weak place of the vise bench. Drills which had been carefully fitted to a job that went out of the shop two weeks ago with a possibility of being duplicated in order, have been changed in sizes when the duplicate order comes to-day. A long cape chisel is transformed into a fluted reamer; the reamer gets slightly nicked at the end, and is next seen as a tap, and it is very probable the tap will go to augment the scrap heap. The wrench serves as the hammer; the lathe ways are handy bench-blocks for straightening rods; the planer-platen is admirably adapted for straightening a sprung shaft under the blows of a fifteen-pound sledge; new files clean the sand and scale for new castings far better than half-worn ones, and any long drill, reamer or chisel is just as good as a jimmy or pinch-bar to use as a lever. When a job comes in the workman goes roaming about the shop to pick up the necessary tools or to find something to make them from. A drill or reamer with shank already formed is much better than a piece from the bar; and so from the general shelf where the tools are kept—the shop floor—he collects his spoil, and after the tools have done duty for that job, they are again "transmogrified" for another. This statement is a little "too previous," as the slangwhangers say, for frequently, before the job is done, some other enterprising shopmate has followed suit and made a second transformation.

In this shop there is a long advance on the rule of some other shops: "A place for everything and everything in its place." The rule here is: "Many places for everything and everything everywhere." Not much time is wasted in such a shop in the construction of gauges, and sets of drills, taps, reamers, etc., are unknown. The old saying that if a presently useless thing is kept for seven years, its time of usefulness will come, does not count for much here. There is no seven years' rest for the most useful thing in this shop; if it finds no call for its proper use in its present form, it is soon refashioned and put at work. In a shop of this character a very useful spanner or open wrench was suddenly missed. The most vigorous search failed to discover it. Weeks passed by and a substitute was made, and the loss became an addition to the long list of mysterious disappearances which excited no wonder. One day the foreman was congratulating himself on having so competent an engineer, who had lately contrived to keep up steam even when hard driven by the machinery. He supposed he had made some repairs, and possibly stopped some leak in the boiler. One nooning he was almost alarmed at the spiteful outrush of heady steam from the safety-valve, and going to the boiler-room—the engineer being at dinner—he noticed some string wound around the safety-valve lever. A close inspection showed the missing spanner, weighed some eight or ten pounds, tied on the further side of the lever, so as to be out of sight, and adding an immense additional pressure per square inch to the boiler. The engineer was simply following the general practice of the shop, and keeping a tool adapted for one purpose busy in some other branch, "when not otherwise engaged."

In such a shop there can be no shop spirit, little of mutual helpfulness. Handy tools are valuable, and when a workman possesses those which are useful and suited to his hand, and fitted for his work, he does not like to see them abused. So, in the scrap-shop there are locked drawers and chests, and queer hiding places for tools, and even shop appliances intended for the general use are pounced upon by some enterprising workman and self-appropriated. Of course, this creates dissatisfaction and engenders unpleasant feelings, which do little to help forward a job when mutual assistance is required.

It is singular that this class of shops does not become extinct. Nobody ever knew the proprietor of one of them to make money or achieve a reputation. Generally a failure is the winding up, and a forced sale, at which the true character of the shop is manifested in the prices paid—the entire concern is sold for scrap purposes. Probably, however, these shops will continue to travesty the name of work-shop, so long as there are slipshods, slatternly mechanics, who have no correct idea of order, and no gift of management. These men serve little use in the world; even their experience is hardly more valuable than their shop products; it serves to augment some mental scrap heap seldom stirred by one in search of a bit of useful information.—*Boston Journal of Commerce.*

INERTIA AND ELASTICITY.—In its admirable series of articles on "Physics without Apparatus," *Nature* gives this experiment, depending partly upon inertia and partly upon elasticity, which is often shown as an after-dinner trick. Upon a linen tablecloth is placed a three-penny-piece between two pennies or other larger and thicker coins. Over this an empty wine glass is placed, and the puzzle is how to get out the smaller coin without touching the glass. The very small operation of scratching with the finger-nail upon the cloth, suffices to accomplish the trick, for the little coin is seen to advance gently towards the finger until it has moved completely away from under the glass. The fibres of the linen cloth are elastic; when you scratch with your finger-nail they are drawn gently forward until the force of their elasticity become too great and they fly back, to be once more drawn forward, again to slip back and so on. While the fibres are drawn forward slowly, they drag the coin with them to a minute distance. But when the slip occurs and they fly backward, they do so very rapidly, and slip back under the coin before there is time for the energy of their movement to be imparted to the coin to set it in motion. So the coin is gradually carried forward over the surface of the cloth.

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MILWAUKEE, DECEMBER, 1880.

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We send out monthly a large number of sample copies of THE UNITED STATES MILLER to millers who are not subscribers. We wish them to consider the receipt of a sample copy as a cordial invitation to them to become regular subscribers. Send us One Dollar in money or stamps, and we will send THE MILLER to you for one year.

MILLERS' DIRECTORY FOR 1880.

All mill-furnishers, flour brokers or other parties desiring to reach the flour mill owners and millwrights of the United States and Canada, should have a copy of the above named work. It contains about 15,600 names with Post-office addresses, and in many cases (notably in Wisconsin and Minnesota) gives the number of runs of stone, sets of rollers, and kind of power used, or the capacity in barrels. A limited number of copies only have been printed. Upwards of 75 of the leading mill-furnishing houses and flour brokers in this country and several in Europe have already secured copies. Send in your orders at once. Price Five Dollars, on receipt of which Directory will be forwarded post-paid by mail, registered. Address

UNITED STATES MILLER,
MILWAUKEE, WIS.

SUBSCRIBE for the U. S. MILLER. Only $1 per year.

THE German Government is going to build several new railroads as early as possible, and thereby greatly increase its transportation facilities.

THE Cockle Separator Manufacturing Company, of this city, have launched out into the general mill furnishing business, and are prepared to supply anything needed in a flouring mill at short notice, and at bottom prices.

EVERY Wisconsin miller who is not yet a subscriber should not fail to subscribe for the UNITED STATES MILLER at once. It is the only milling newspaper published in Wisconsin. One dollar a year is the subscription price.

HUNGARIAN millers are not a little surprised that American flour should be sold in their markets at a price lower than they are willing to sell at. American wheat fields and American millers are surprising the world, and the end in not yet.

We respectfully request our readers when they write to persons or firms advertising in this paper, to mention that their advertisement was seen in the UNITED STATES MILLER. *You will thereby oblige, not only this paper, but the advertisers.*

We will send a copy of the MILLERS' TEXT BOOK, by J. M'LEAN, of Glasgow, Scotland, and the UNITED STATES MILLER, for one year, to any address in the United States or Canada, for $1.25. Price of Text Book alone, 60 cents. Send cash or stamps.

MILLERS, saw and planing mill owners, and others desiring to purchase any kind of flour, saw mill or planing mill machinery or supplies, will consult their own interests by reading the advertisement of H. P. Yale & Co., on first page, and writing to them for prices.

A SYNDICATE of American and English bankers has been formed to furnish $40,000,000 with which to complete the Northern Pacific Railroad within the next three years. This and lines recently constructed will open up an immense quantity of wheat land to successful cultivation.

IN 1870 the various manufacturing establishments in New Orleans gave employment to 5,640 persons, and produced $9,980,278 worth of articles. In 1880 the number of persons employed was 10,977, and the product worth $20,909,047. This is an increase of nearly 100 per cent. in the number of employes, and more than 100 per cent. in the product; a very fair showing considering surrounding circumstances.

THE Consolidated Middlings Purifier Company and the Lacroix Middlings Purifier Company have effected a compromise of their differences, the Lacroix Company recognizing the validity of Smith's brush patent, and assigning all their interest in the brush patent to the Consolidated M. P. Co. The Consolidated Company now own more middlings purifier patents than ever.

THE UNITED STATES MILLER for 1881 is what you should subscribe for at once. The paper will continue to be as in the past a faithful and reliable chronicle of all matters of interest to the milling trade. Manufacturers and mechanics of all kinds can gain valuable information from its columns. The subscription price is one dollar per year, and it is fully worth it. Subscribe at once. Remit currency or postage stamps by mail at our risk. You will receive a receipt by return mail.

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New Publications.

BARR'S HAND-BOOK FOR STEAM ENGINEERS.—The work is intended as a guide for persons in charge of, or in any way connected with, steam or steam machinery. It is not, and does not aim to be, an elaborate treatise on the steam engine, but a volume containing valuable and plainly-stated facts which every one who has anything to do with steam should possess. This book is published by J. H. Kerrick & Co., Indianapolis, Ind., and will be sent by mail on receipt of one dollar.

Immigration.

The Chief of the Bureau of Statistics furnishes the following information in regard to immigration into the United States. There arrived in the customs districts of Baltimore, Boston, Detroit, Huron, Minnesota, New Bedford, New Orleans, New York, Passamaquoddy, Philadelphia and San Francisco, during the month ended October 31, 1880, 69,808 passengers, of whom 61,312 were immigrants, 5,995 citizens of the United States returned from abroad, and 2,491 aliens not intending to reside in the United States.

Of this total number of immigrants there arrived from England, 6,665; Wales, 110; Scotland, 1,388; Ireland, 5,705; Germany, 17,059; Austria, 1,555; Sweden, 3,486; Norway, 1,453; Denmark, 970; France, 551; Switzerland, 923; Spain, 79; Holland, 230; Belgium, 141; Italy, 1,651; Russia, 325; Poland, 184; Hungary, 481; Finland, 14; Dominion of Canada, 17,517; China, 474; Australia, 81; Mexico, 33; Portugal, 82; Azores, 79; and from all other countries, 70.

Personal.

Mr. A. P. Holcombe, of the firm of Huntley, Holcombe & Heine, visited Milwaukee during the month.

Mr. Wm. Allis has gone South for a brief visit to recuperate his health. He expects to return quite well in a short time.

November 5, Col. Rodney Mason, of Washington, D. C., favored this office with a call. The colonel is in the West in behalf of his clients in patent cases.

We are pleased to announce the marriage, on November 3, of Capt. Robert E. Bain to Miss Marie Valle, all of St. Louis. The bridegroom is a son of George Bain, President of the Millers' Association.

It is our sad duty to record the death of Edward Campbell, who has served faithfully as head miller in the Star and Crescent Mills, of Chicago, for many years. Mr. Campbell died of heart disease, on the morning of October 27. His countless friends throughout the country will long remember the genial and generous, whole-souled Edward Campbell.

During the early part of the month we received a pleasant call from Wm. Moore, Esq., senior partner of the firm of Wm. Moore & Co., flour brokers of Liverpool, England. Mr. Moore has been travelling through this country for some weeks, taking observations. He has visited St. Louis, Minneapolis, Milwaukee and other flour manufacturing centres of greater or less importance, and will soon return to England. Mr. Moore expressed himself highly pleased with the beautiful city of Milwaukee, and predicted for it a brilliant future.

Cockle.

The cockle (Xantheum Strumarium) has come to be a very common weed in various parts of this country, and its peculiarly shaped seed was for many years a great annoyance to millers. It cannot be removed satisfactorily by the ordinary separating machines, and it was long since found necessary to have a machine invented especially for its separation from grain. The stalks grow to a height varying from one to four feet, and have many branches. The pods contain two seeds each, and they will propogate their kind rapidly if afforded any reasonable opportunity. Such a nuisance did this seed become in Pennsylvania some years ago that the Legisiature offered a prize for the invention of a machine that would effectually separate it from grain. Machines with flannel and cork rollers were invented but were of little use. A machine was subsequently invented, and is now being successfully manufactured for millers use by the Cockle Separator Manufacturing Company, of Milwaukee, Wis. These machines remove every cockle seed, and are simple in construction and accurate in the performance of their duties. Many thousands of these machines are in use in the flour mills throughout this country as well as in Europe. The farmer and the miller has pronounced the cockle seed a nuisance and of no earthly good, but it has remained for the distiller to discover that cockle seed properly treated will yield a most palatable and pungent whisky, and it is a fact that the cockle is actually bought from millers by distillers for distillation.

Our Export Trade in Breadstuffs.

Exports of breadstuffs from all the United States ports for the month of October, 1880, and compared with the corresponding month of 1879:

	—October, 1880.— Quantity.	Value.
Barley, bus	241,377	$137,463
Corn, bus	8,534,217	4,600,465
Meal, bbls	30,128	88,366
Oats, bus	19,152	9,606
Rye, bus	276,407	267,792
Wheat, bus	15,611,695	17.209,980
Flour, bbls	618,691	3,398,396
Total		$25,711,396

	—October, 1879.— Quantity.	Value.
Barley, bus	93,281	$76,345
Corn, bus	5,679,191	3,157,721
Meal, bbls	26,536	74,964
Oats, bus	29,527	11,668
Rye, bus	494,700	380,001
Wheat, bus	19,545 217	25,549,665
Flour, bbls	648,313	3,798,243
Total		$33,048,607

These figures show a very large increase in the exports of corn, but a corresponding decrease in wheat and flour. The total decrease in the value for the month as compared with last year was $7,300,000. In 1879 the exports of wheat were very large from early in the summer up to the latter part of October, but during the last two months of that year the shipments were comparatively light, owing to the relatively higher prices in this country as compared with those of Europe, but during October, 1880, the European demand was slack, and hence the decrease in exports as shown by the above figures. The present month will, however, doubtless change the order of things, as the exports are now quite large and are in excess of the same month of 1879. The total exports of breadstuffs from the United States for the ten months ended Oct. 31, 1880 and 1879, were as follows, flour and meal being reduced to bushels:

Articles.	—October 31, 1880.— Bushels.	Value.
Barley	1,095,427	$724,265
Corn	100,558,875	54,167,468
Meal, bbls	1,275,472	926,382
Oats	501,827	224,013
Rye	1,919,851	1,719,540
Wheat	120,355,571	144,576,375
Flour, bbls	22,358,254	28,999,042
Total	248,065,277	$231,338,030

	—October 31, 1879.— Bushels.	Value.
Barley	991,213	$612,302
Corn	76,294,694	35,848,665
Meal, bbls	1,192,220	751,625
Oats	1,033,767	342,870
Rye	4,111,795	2,760,369
Wheat	126,202,745	142,135,255
Flour, bbls	21,343,792	25,554,258
Total	231,170,226	$208,005,344

As shown by the above table there has been an increase of 100,000 bus. barley; 24,209,000 bus. corn; a small gain in meal and an increase of 225,000 bbls. flour, while in oats and rye there has been considerable falling off. Wheat shows a decrease of nearly 6,000,000, but an increase in value of $2,400,000, due to the high prices prevailing in the early part of the year. There has been considerable talk of late about the great increase in the exports of flour but according to the above official figures the gain has only been 225,000 bbls. for the ten months, and during October the exports were only 618,691 bbls. against 648,313 bbls. for the corresponding month of 1879, being a decrease of 30,000 bbls. It is true that the showing made by the exports of flour for the ten months is much better than that made by wheat, but it is hardly sufficient to justify the notoriety given to it. The *New York Produce Exchange Reporter* has on several occasions predicted that the flour movement would be very heavy during the winter, and perhaps this may prove to be the case, as that journal is generally quite well informed.

The total values of the exports of breadstuffs were as follows, in detail:

OCTOBER.

Port.	1880.	1879.
New York	$13,862,218	$14,698,854
Boston	1,122,895	1,680,295
Philadelphia	2,652,921	3,354,290
Baltimore	3,871,508	7,326,841
New Orleans	994,766	872,853
San Francisco	2,266,636	4,164,771
Buffalo Creek	200	.....
Chicago	181,097	328,082
Detroit	189,027	2,734
Galveston	1,405	.....
Huron	191,997	15,879
Key West	14,736	19,032
Miami	216,197	351,966
Milwaukee	41,000	44,000
New Haven	6,275	4,580
Richmond	148,680	190,430
Totals	$25,711,468	$33,048,607

TEN MONTHS.

New York	$114,637,901	$95,799,271
Boston	13,313,452	10,601,528
Philadelphia	22.699,723	25,840.248
Baltimore	42,921 389	43,326,881
New Orleans	19,359 139	4 253 877
San Francisco	13,218,150	17,896,011
Buffalo Creek	20,574	175
Chicago	3,592,704	2,639,207
Detroit	1,417,924	1,074,302
Galveston	2,913	2,076
Huron	1,682,599	404,291
Key West	333,418	236,664
Miami	4,501,903	3,677,978
Milwaukee	1,016,997	1,330.367
New Haven	59,209	35,197
Richmond	1,560,035	887,271
Totals	$231,338,030	$208,005,344

The First Iron Casting.

Cast iron is now in such general use that one might be apt to imagine that it had never been invented; but, like Topsy, "had growed." Cast iron was not, however, in commercial use before the year 1700, when Abraham Darby, an intelligent mechanic, who had brought some Dutch workmen to establish a brass foundry at Bristol, conceived the idea that iron might be substituted for brass. This his workmen did not succeed in effecting, being probably too much prejudiced in favor of the metal with which they were best acquainted. A Welsh shepherd boy named John Thomas, had some little time previous to this been received into his workshop on the recommendation of a distant relative. Whilst looking on during the experiments of the Dutch workmen, he said to Abraham Darby that he thought he saw where they had missed it. He begged to be allowed to try, so he and Abraham Darby remained alone in the workshop all night struggling with the refractory metal and imperfect moulds. The hours passed on, and daylight appeared, but neither would leave his task, and just as the morning dawned they succeeded in casting an iron pot complete. The boy entered into an agreement with Abraham Darby to serve him and keep the secret. He was enticed by the offer of double wages to leave his master, but he continued faithful, and from 1709 to 1828 the family of Thomas were confidential and much-valued agents to the descendants of Abraham Darby. For more than one hundred years after the night in which Thomas and his master succeeded in making an iron casting in a mould of fine sand, contained in frames and with air-holes, the same process was practiced and kept secret at Coalbrook Dale with plugged keyholes and barred doors.

Correspondence.

LYNCHBURG, Va., Nov. 7, 1880.

Editor United States Miller:

'Tis not often you have a letter from this quarter. This point is more of a tobacco region, than one devoted to growing the staff of life. It has improved greatly since the war. Its population is about 20,000, and the black and white population about equal. All labor in the many tobacco factories, warehouses, etc., and are of all sizes, ages and complexions. 'Tis a dull time, and none of the factories are working more than half their time. There are five mills that make flour, two of the oldest run six pair of burrs each, and one of them claims that the fixtures as used in the days of the Pharaohs were decidedly the best, and the modern machinery is a nuisance and humbug. There are about 25 run of stone in all the mills. Milling is unprofitable in many parts of Virginia, the difference in favor of wheat over the price of flour being such that many farmers sell their wheat to go to Richmond, Baltimore, etc., in preference to grinding it. A striking illustration of this is in the county of Shenandoah, where two brothers erected a mill with six pair of burrs, at a cost of $20,000, and then sold their crop of 13,000 bushels. The wheat is for the most part seeded in the valley, and has come up beautifully. In this Piedmont region very little has yet been sown.

The crop of corn through Virginia, as through most of the United States, is an extraordinary one. Crops of most of all kinds are unusually plenty. I observed some hogs in the woods in the valley a few days ago, feeding on the white oak mast, so fat they would have made a Porkopolis dealer's mouth water.

HAMILCAR.

[A letter from P. D. Mickles which is not exactly encouraging to Millers.]

The Denchfield Patent Case.

Editor United States Miller:

I take the liberty of sending you a printed copy of Judge Blatchford's latest decision touching the validity of the Denchfield patent.

Of course the jovial millers throughout the world—the milling world I mean—look to your columns for intelligence of all matters pertaining to their welfare, and this finding of Judge Blatchford being calculated to have some slight bearing upon their interests, to those of them at least who have been infringers upon this claim, you may think it worth while to bring it to their attention.

This decision of four cases together with three others by the same tribunal during the past season completes the adjudication of nine cases, brought to establish the validity of the Denchfietd patent (unless recourse shall be had to the United States Supreme Court), and every point both in law and in equity, raised by either party has been decided by the several courts in favor of the claim.

If there was a possibility of ever gaining a suit for the infringers of this patent—if by any means its claims could be invalidated, doesn't it seem to you, sir, about time for some sign, some token in that direction?

The gentle millers and their legal advisers were positive that when Judge Harding took hold of the matter, and brought it before Judge Blatchford whom the claimants could not influence and whose decree would be according to the law and the facts, then they should be satisfied and we should have occasion to laugh out of the other corner of our mouth.

Well, all the conditions stipulated for have been complied with, and nothing has been lacking to enable them to present their case as strongly and as favorably as it could have been done; and, sir, it has transpired exactly as we were assured it would—in one respect—we are laughing out of the other corner of our mouth—we are laughing out of both corners.

Should some of your thoughtful readers, pondering over this "lame and impotent" advantage which has accrued to them, as the result of some seven years litigation, and which has only tended to strengthen the claim against them, conclude this method of postponeing the day of reckoning to be paying rather dearly for their whistle,—that there was a more straight-forward, manly way of doing business than resorting to mere quibbling, with the futile purpose of tiring out somebody, deem it to be the part of wisdom to accept the inevitable, let them turn to the false siren who would allure them to further folly, and in sharpest tone say—scat!

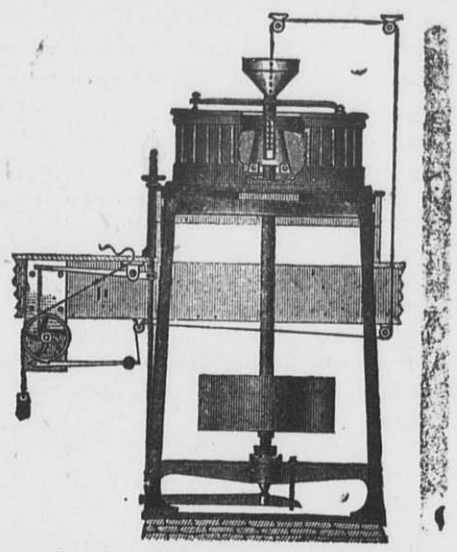
I have pleasant recollection of your courtly President Sanderson, and of your suave and genial Secretary Seamans, to each of whom I beg to send my "compliments of the season," through your columns. Yours with much esteem.

P. D. MICKLES.

THE Canadian millers are said to be in not the happiest frame of mind possible. A late issue of *The Toronto Globe* says: "We are obliged once more to call attention to the evils resulting from the bonding system. Within the past few weeks there have been large quantities of flour made from United States wheat sold in this market. The prices at which this flour is sold are much below those of Canadian wheat flour, and give rise to the belief that the duty was evaded. Our local millers are the sufferers, and is it any wonder that they complain? They are forced to compete with this foreign flour after having to pay a heavy duty on their domestic wheat."

A Valuable Invention.

We desire to call the attention of our readers using millstones to the illustration herewith of Fruen's Automatic Stone Lift. It is simple in construction, acts quickly and effectively and should be in use wherever millstones



are employed. By looking at the illustration referred to the reader will have no difficulty in understanding its action, and will readily observe that it can be attached without stopping the mill. A cord, having upon it a series of leather disks, is suspended in the hopper, working something upon the principle by which the old-fashioned alarm bell was operated. This cord, passing over the pulleys, as shown in the cut, is attached to the end of a weighted lever. A ratchet tooth at the opposite end of the lever engages with a wheel, as seen at the left of the cut, This wheel is connected with a smaller drum, around which passes a chain which operates another lever connected with the lighter rod. A weight sufficient to lift the stone is suspended by a cord passing around the wheel. The action of this ingenious arrangement is so simple as to hardly require an explanation. As long as the stream of wheat running into the hopper is uninterrupted its weight on the end of the cord is sufficient to hold the lever in position against the wheel. The moment the feed is stopped, however, the weight on the lever causes it to drop, releasing the wheel. The suspended weight winds the chain about the drum, thereby moving the lever attached to the lighter rod so as to lift the runner enough to prevent it from striking the bed stone. This device is at once simple and effective. So long as the supply of feed to the stone does not run out or is not interrupted the machine is not called into play; but when the hopper becomes empty, it acts instantaneously, so that there is no possibility of any damage being done by the stones running together. Having no pulleys or running machinery to attach it is easily put in, and is no trouble to keep in repair. Any further information that may be desired regarding the lift can be obtained by addressing the manufacturers, the Victor Heater Co., Minneapolis, Minn.

A RIVAL OF THE GREAT EASTERN.—The Furnesia, a new monster steamship launched by the Barrow Iron Shipbuilding Company, at Barrow, England, a short time ago, is, with the exception of the Great Eastern, the largest ship afloat. The Furnesia is 445 feet in length between perpendiculars, 44 feet 6 inches beam, 34 feet 6 inches depth of hold, 5,500 gross tonnage, and 9,900 tons displacement of water when drawing 25 feet. She is to be brig-rigged, with two funnels. Her engines are of the inverted, direct acting, compound, surface-condensing type. The high-pressure cylinders are 49 inches and the low-pressure cylinders are 100 inches in diameter. with a stroke of 5 feet 6 inches. The pressure of steam is 90 pounds to the square inch, and this is generated by four double-ended boilers, having in all 24 furnaces. The propeller is 20 feet 6 inches in diameter. The new vessel was built for the Anchor Line, by which it will be run between New York and Glasgow.—*Iron Age.*

"Magyar" Flour.

Many causes have of late tended to create depression in the Budapest milling trade, and not unnaturally some of the parties interested have sought help from the Governmet to overcome the difficulties they have to contend against. An invitation from the Minister of Commerce to call upon him seemed to give some hope to the directors of the mills that something was at last going to be done to aid them. Instead of obtaining assistance, they were subjected to a cross-examination as to the nationality of their foremen and employes, and the reason why so few Hungarians were employed. The result showed that only one Hungarian foreman was employed, and that at the Victoria Mills; the remainder proved to be Styrians, Tyrolians, or Germans, a fact at which his Excellency the Minister of Commerce was highly indignant. Director Brull in reply stated that the native Hungarians were seldom able to read and write, and besides they did not seem to care for a technical education. With the workmen of other nationalities the case was different, and thus it happened that they could eventually better their position without regard to nationality. The members of the deputation then received the ungracious advice to see that this state of affairs should be altered. As the Minister of Commerce is so intensely patriotic as to wish the Hungarian flour to be made by Hungarian workmen, superintended by Hungarian foremen, and working Hungarian machines, the *Ungar Muehlen Zeitung* recommends him to see that the directors and owners of the mills are natives too. Although the greater part of the business is transacted in German, it might be as well also to issue an order for all correspondence to be carried on in Hungarian, which would prove especially acceptable to the English, French and German houses trading with Budapest. Unless the Minister of Commerce can devise some other means to meet the foreign competition the future prospects of the trade are very gloomy.—*The Miller.*

First Steam Whistle on the Missouri.

The story of the first steam whistle on the Missouri river is amusing. Its introduction dates back to 1844. At that time the settlers on the Missouri river were in the habit of making yearly visits to St. Louis to do their trading for themselves and their friends. They were not provided with daily intercourse with the outside world, and many who lived back from the river seldom, if ever, saw a steamboat more than once a year. It happened that during the fall of 1844 the new steamboat "Lexington" started up the Missouri river loaded down to the guards with freight. Among the passengers were Judge Joseph C. Ransom, Theodore Warner, of Lexington, Ben Holiday (afterward the famous overland stage proprietor), Colonel Pomeroy, of Lexington, and a planter of Platte county, named George Yocum.

The steamer Lexington was provided with a steam whistle—the first used on the Missouri river; and, as it happened, no one knew anything about it except Warner, who was a wag and a lover of joke. The night after leaving St. Louis, the passengers were collected together playing cards (for fun) in the cabin, when the talk turned upon steamboat explosions then very common.

"I feel perfectly safe on this boat," said Warner as he dealt the cards.

"Why?" inquired Yocum, the planter.

"Why?" echoed the rest of the company.

"I will tell you why," said the wag, carefully studying his cards. "This boat is provided with a new safety-valve, which notifies the passengers on board just when it is about to blow up. It is a concern which makes an unearthly noise; and, when you hear it, it is time to get back aft or jump overboard."

Notwithstanding the fact that Warner told his story with the most solemn and earnest countenance, some were skeptical. Not so, however, with the planter. Next morning, as the Lexington was steaming up the long stretch of river just below Washington, Mo., the passengers were at breakfast. The meal had been called, and all were busy engaged in doing justice to the kind of meals they were accustomed to serve on steamboats in those days. Suddenly the whistle commenced to blow, the first time on the trip. The passengers looked at each other a moment, and horror and dismay spread itself over their faces. The first man to realize the situation and to act, was Yocum, the planter, who, with hair erect and blanched face jumped up, crying as he pulled over one after another of the passengers:

"Run, run for your lives! The blame thing is going to burst! Follow me, and let's save ourselves!"

Of course, there was a stampede for the rear of the boat, and it was only by the exertions of some of the crew that the more excited were restrained from jumping into the river.

The Cause of Perpetual Snow.

Many persons who have made the acquaintance of the mountainous districts of Europe have often wondered why snow at great elevations does not melt. Dr. James Croll says it is owing to the fact that the heat received from the sun is thrown off into stellar space so rapidly by radiation and reflection that the sun fails to raise the temperature of the snow to the melting point—the snow evaporates, but it does not melt. The summits of the Himalayas, for example, must receive more than ten times the amount of heat necessary to melt all the snow that falls on them, yet in spite of this the snow is not melted. Notwithstanding the strength of the sun and the dryness of the air at these altitudes, evaporation is insufficient to melt the snow. At low elevations, where the snow-fall is probably greater, and the amount of heat received even less, the snow melts and disappears. This, Dr. Croll believes, must be attributed to the influence of aqueous vapour. At high elevations the air is dry, and allows the heat radiated from the snow to pass into space, but at low elevations a very considerable amount of the heat radiated from the snow is absorbed by the aqueous vapour in the atmosphere. A considerable portion of the heat thus absorbed is radiated back on the snow, and, being of the same quality as that which the snow itself radiates, is for that reason absorbed by the latter. The consequence is that the heat thus absorbed accumulates in the snow till this is melted. Were the amount of aqueous vapour possessed by the atmosphere sufficiently diminished, perpetual snow would cover our globe down to the sea-shore. In a like manner the dryness of the air will, in a great measure, account for the present accumulation of snow and ice in Greenland and on the Antarctic continent. The reason why the snow does not melt is not because the amount of heat received during the year is not equal to the work of melting the ice, but mainly becaase of the dryness of the air, the snow is prevented from rising to the melting point.

MILWAUKEE ITEMS.—A sad accident, resulting fatally, happened at B. Stern's New Era Flour Mills in Milwaukee, on the evening of Nov. 10. An employe named Fred Roderman fell into a bran hopper and sinking into the mass was suffocated before assistance could reach him. He was 23 years of age and leaves a family consisting of a wife and two children. He had only commenced working in the mill about a week previous to his death.

Fred Horn has leased the mill at Hales Corners, and will run it hereafter.

The foundation walls of the Milwaukee Exhibition Building are now laid, and the superstructure will rapidly rise. If the weather is favorable it is probable that it will be under oof before the end of the present year.

MINNEAPOLIS ITEMS.—The Trade Mill has been undergoing repairs.——The Galaxy Mills are putting in several new rolls.——The Dakota Mills have their rolls in place and have started up.——A 44-inch Victor turbine wheel, built by the Stilwell & Bierce Mfg. Co., of Dayton, Ohio, drives the machinery of the Crown Roller Mill.——The Palisade Mills have started up their new Stevens roller mills.——The North Star Iron Works have removed the traces of the late fire and are crowded with work.——The Empire Mills are putting in Downton roller Mills.——The fire alarm and fire extinguishing apparatus of the Washburn mill is the most complete of any in the world.——Gunn, Cross & Co., is the name of the prominent millwright firm in Minneapolis.——C. W. Hughes, representative of the Hughes Bran Duster Co., of Hamilton, Ohio., who has been stopping in Minneapolis for some time is about to leave for England.——The Arctic Mills are now run by Messrs. Sidle, Fletcher, Holmes & Co., also propoietors of the Northwestern Mill; Chas. Peasley, formerly of the Washburn C, is head miller.

Simpson & Gault have a force of millwrights at work overhauling the mill of Fred Holsen at Allendale, Ill. They are changing it to new process, and are adding two run of 42 and one run of 30-inch burrs; also, one No. 2 Brush, two No. 2 Snow Flake purifiers, one 6-reel chest, and all necessary gearing and shafting for making a first-class new process mill.

UNITED STATES MILLER.

E. HARRISON CAWKER. EDITOR.

PUBLISHED MONTHLY.

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MILWAUKEE, DECEMBER, 1880.

SUBSCRIBE for the U. S. MILLER.

MR. W. H. DUNWOODY, of the firm of Washburn, Crosby & Co., of Minneapolis, is at present in London.

THE Hungarian flour trade is reported to be exceedingly dull, with little prospect of an early improvement.

THE worthy citizens of Glasgow, Scotland, have elected Mr. John Ure, of the Crown Mills, their Lord Provost.

THE population of this country has been increased about half a million this year by immigration. Over 20 per cent. of the immigrants were from the Dominion of Canada.

"GRAHAM" flour is pronounced by the *Journal of Chemistry* to be good as a gentle laxative but far inferior to the best grades of fine flour in nutritious qualities.

RECEIPTS of the Patent Office for the fiscal year, from fees of various kinds, aggregated $730,547, and total expenses, $538,926, showing a net revenue to the government of $191,621.

ACCORDING to the late census Chicago has twelve flouring mills, the combined capital of which is $652,100. They employ 187 persons, pay $105,326 wages, use raw material of the value of $1,937,609 and make $2,217,564 in products.

OUR readers everywhere, when writing to advertisers, are earnestly requested to mention the UNITED STATES MILLER in their letters. Such mention is of benefit to the paper, and advertisers like to know as far as possible what papers benefit them most.

THE Government influence in fixing prices is wonderful in Russia. The Government in its official organ recently intimated that the bakers charged an unreasonably high price for bread, whereupon 117 of the St. Petersburg bakers reduced their prices immediately.

DIED, at Janesville, Wis., Nov. 30, 1880, of typhoid pneumonia, O. B. Ford, aged 67 years. Mr. Ford was one of the oldest and most prominent citizens of Rock county, and was largely interested in milling and the water-power at Janesville. He came to Wisconsin from New York in 1854. He leaves a family consisting of wife, daughter and two sons.

A NEW KIND OF BREAD.—There has been lately turned out at Milan a new kind of bread made with blood from raw flesh. It is said to be a preventive of scurvy, and to do away among peasants with all desire for alcoholic drinks. The difficulty of blood coagulation being overcome, the "blood bread" will last for years. Twenty per cent. of its ingredients consists in blood, its cost is only $\frac{3}{4}$ of a cent per loaf, and it is more nutritious than the ordinary loaves at 1 cent each.

THE correspondent of THE UNITED STATES MILLER, at Berlin, Germany, says that the milling business is very dull there. That the native wheat is generally too damp to make good flour, and that their excessive protective tariff on grain prevents them from obtaining supplies from abroad for mixing purposes. The heavy protective duty on rye has made rye as expensive as wheat. The great Borsig Rye Flour Mills are now running half time on wheat, when formerly they run constantly on rye. Great efforts are to be made to remove or mitigate the obnoxious tariff.

ON Friday, Nov. 5, there occurred in North Texas the most remarkable phenomenon known in the history of Texas. The morning broke with a cold damp norther, interpersed with sleet, but at 10 o'clock the whole heavens were filled with snowflakes. It continued to fall for eight consecutive hours, or until quite dark. This snow came before any portion of Texas had been visited by a killing frost. It thus fell upon forests full-blown, fields with green crops still standing and growing in them, gardens in bloom. Here were morning-glories saluted and embraced, chilled and killed by its icy visitor Geraniums were fatally kissed by snow-drops, as were four-o'clocks frozen by the deadly touch of the unwelcomed, unheralded, and wholly unexpected visitation. Never did an old Texan of forty and fifty years' standing see a snow-storm in November before, and on its fifth day at that. They were more than astonished.

DUNHAM, FILS ET CO., No. 3 Place des Halles, Rouen, France, is the name of a new mill furnishing firm. They solicit the agency for France for American machinery, and will be happy to have manufacturers favor them with late catalogues and price lists. Mr. Dunham is the son of Wm. Dunham, the editor and publisher of *The Miller*, London. He visited this country during the past summer, and is quite extensively known personally by our milling machinery manufacturers and millers. We wish him unlimited success in his Rouen adventure.

New Publications.

THE AMERICAN NEWSPAPER ANNUAL, published by N. W. Ayers & Son, Philadelphia, Pa., a well known advertising firm, is without doubt the most complete and handsome publication of the kind extant. It gives a list of all the newspapers in the United States and Canada, with memoranda of the extent of their circulation, religion, politics or other distinctive characteristics, and the population according to census of 1880, of the places where they are published. To the extensive advertiser this work is invaluable, and to the newspaper publisher it is a work of great utility. Typographically, we seldom see its equal.

Report of PROCEEDINGS OF THE UNITED STATES BOARD OF SUPERVISING INSPECTORS OF STEAM VESSELS, by James A. Dermont, Supv. Ins. Gen. of steamboats.

ILLINOIS MANUFACTURERS DIRECTORY. Fox, Cole & Co., 177 La Salle st., Chicago, Ill., publishers. This is a work, 228 pages in size, which shows the result of much patient labor and commendable enterprise. It is conveniently arranged and enables the possessor to reach the manufacturers of the state, of any class by circular or otherwise quickly. The demand for such a work is always large and we have no doubt but this has met with an extensive sale. Price $3.00.

RECHARD'S TURBINE WATER WHEEL CATALOGUE FOR 1880, by George F. Baugher, York, Pa., a handsome 100 page catalogue giving much information in relation to turbine wheels, and the Rechard wheel in particular. Will be sent free on application to users of water power.

Flour vs. Wheat.

According to the figures just furnished by the statistician in the Department of Agriculture, the estimates of the amount of wheat raised in the Northwestern States and Territories are as follows:

Wisconsin	16,464,000
Minnesota	40,752,000
Dakota and other N. W. Territories	18,005,000
Total	75,221,000

This is a sufficient quantity of wheat to make upwards of 16,000,000 barrels of flour, and the mills now in active operation in Wisconsin, Minnesota and Dakota are amply able to convert the *entire* amount of this wheat into flour, and are now busily engaged in converting the *best* of it, and it is not desirable to the millers of this district to have *any* really good wheat shipped either to the Eastern States or Europe, and it is not likely that shipments of good milling wheat, beyond Milwaukee and Chicago, will be extensive during the coming winter and spring, but it is evident that the flour trade will be vastly augmented. The milling capacity of this district has recently been greatly increased, and the latest and best improved machinery known has been extensively introduced, and the millers are determined, as far as possible, to grind the wheat here and thus prevent its being, except in a manufactured state, such an extensive article of export as in the past. The foregoing remarks apply to spring wheat only, and it seems probable that the exports of wheat in a short time will be almost exclusively confined to winter wheat, but the sooner the export of wheat altogether gives place to that of flour, the better it will be for the milling fraternity of the United States.

The Middlings Purifier Cases.

THE WAR ENDED BETWEEN THE LACROIX AND CONSOLIDATED COMPANIES.

Two important cases in the United States Circuit Court at Indianapolis were finally disposed of on November 15.

The Consolidated Middlings' Purifier Company, of Jackson, Mich., sued the Lacroix Middlings Purifier Company for damages on account of infringement of certain patents granted to George T. Smith and William Stoll, the main feature of the patents being the combination of a travelling brush with a sieve and blast of air. The Lacroix Company answered among other things that the patents had been surreptitiously obtained, and that E. N. Lacroix was the original inventor. After a year employed in taking evidence, the parties agreed upon a settlement. The Consolidated Company paid the Lacroix Company for infringement and licenses, the judgments entered being an agreement of parties, and merely nominal, and at once satisfied of record without any money passing. The Consolidated Company also bought the brush patent, owned by the Lacroix Company, paying to the Lacroix Company for that patent and for infringements and licenses $5,000 in cash. The Consolidated Company also executed a written agreement that the machine now manufactured by the Lacroix Company is not an infringement of any of the patents owned by the Consolidated Company, and consequently the Lacroix Company and purchasers from them will not be further annoyed by suits for infringement.

The other case was that of the Lacroix Company vs. William Paddock & Co., millers of Terre Haute, for infringement of patents owned by the company, the infringement consisting in the use of machines made by licenses of the Consolidated Company, and defended by that company, and was also adjusted, and the machines used by Paddock & Co. were licensed under the Lacroix patent, the Consolidated Company having purchased immunity for all customers. The main feature admitted to be an infringement is the over-lapping boards used to admit air under the sieve, known under the various names of "over-hanging boards," "central suction," and "cant boards."

It will thus be seen that the Consolidated Company has a clear field for the manufacture and sale of brush machines.

Recent Milling Patents.

The following milling patents were issued from the United States Patent Office in December, 1880:

Corn Sheller.—James L. Woods, Alliance, Ohio.

Middlings Purifier.—James H. Redfield, Salem, Ind.

Cockle Mill.—James M. King, Walnut Station, Minn.

Magnetic Grain Separator.—Cook & Thayer, Ripon, Wis.

Bag Holder and Tie.—Lewis S. Fish, Faribault, Minn.

Oat Meal Machine.—Fahs, Belden & Kremer, of Akron, O.

Grinding Mill.—Thomas J. Obenchain, Logansport, Ind.

Grain Separator.—James F. Hatfield, of Cambridge City, Ind.

Germ Detacher for Roller Mills.—Adolph Fredenhagen, St. Charles, Ill.

Grain Measure and Register.—John A. Porter, of Oakland Mills, Ky.

Buck-wheat Hulling Apparatus.—Beaty & Calkins, Painted Post, N. Y.

Magnetic Separator.—Gottlob Schaeffer, Göppingen, Würtemberg, Germany.

Grain Steamer and Drier.—Frederick A. Hoffmann, Baldwin City, Kansas,

THE *Allegemeine-Mueller Zietung*, of Berlin, Germany, in referring to the Cincinnati Millers' Exhibition, says, that it was no greater than the one held in Berlin in 1879. That at Berlin but two American machines were on exhibition, and at Cincinnati there were four German machines. In conclusion it says: "We are, therefore, led to the belief that commerce in milling machinery between the two countries is very limited as far as patented objects are not concerned, which is owing principally to the high tariff and freight which will discourage such trade. There is also no especial demand for interchange of milling machinery, for we believe America produces no milling machinery better adapted to our use than we manufacture ourselves at as low a price as we can import it for. The Americans can say the same in regard to German milling machinery. Americans pay less for their raw material, but they pay higher wages than we do."

A LENGTHY article entitled "Prospects of Grain Production and the Water Routes in North America," recently published in the *Austro-Hungarian Miller*, calls the attention of its readers to the competition likely to become serious to the grain producers of Europe from America. It details our magnificent railroad, lake, river and canal system of transportation, commends its efficiency and cheapness and says that Europeans must imitate our example by increasing its transportation facilities and reducing the exorbitant freight tariffs of the present. The *Miller* believes that by a grand effort on the part of the grain producers and the transportation companies of the country that competition can be successfully resisted.

The Adulteration of Flour.

The amount of discussion which the subject of flour adulterations has produced, admirably illustrates the saying, "Tall oaks from little acorns grow." While the quantity of discussion has been remarkably large, the amount of adulteration discovered has been almost if not quite insignificant. Every once in a while our foreign exchanges bring the news of some unprincipled miller or flour dealer being detected in mixing his flour with some foreign substances for the purpose of cheating in weight or color; but when we consider the thousands who are engaged in making and handling flour, the amount of sophistication indulged in, at least the amount discovered, is exceedingly small. Still, instances are by no means wanting abroad, where flour has been adultered with plaster of paris, sand, chalk, alum, and numerous other substances which are available for the purpose of adding bulk or giving color to the flour. About fifteen months since a cargo of flour which found its way to London from some Dutch or Flemish port, was so largely adulterated with plaster of paris, that bread could not be made from the mixture. The public very properly raised an outcry and demanded an explanation. We do not remember what explanation was given; but probably the burrs ground so close as to grind their plaster of Paris backs off into the flour.

Affairs have never been nearly so bad as that in the United States, although a number of agitators east and west have attempted to make us believe that the adulteration of flour is a practice common with millers and dealers. It has been asserted that mills are engaged as a regular business in grinding up feldspar and similar articles into impalpable flour to be mixed with flour. While such *may* be the case, we do not feel called upon to believe the statement, until better proof of its correctness has been adduced. Adulteration in foreign countries consists principally in adding to wheat flour the meal of cheaper grains, and the same is true of the United States, where white corn is principally used. The only mineral adulteration we are aware of being used is alum, which some millers who have inferior wheat to grind, or who have inferior skill in grinding any wheat, employ for the purpose of "touching up" the color and rising properties of the flour. Reprehensible as this practice is, where very small quantities are used it does not prove injurious; but no miller can afford to employ such means since disastrous effects have been known to follow the misjudged use of alum. We are glad to know that the use of this mineral and other adulterants is so rare as it is in our country. While Mr. Angell and other alarmists make sweeping charges against the manufacturers and sellers of foods, including flour, cooler headed people have not been able to find any such evidence as the alarmists would lead us to expect. The state assayer of Massachusetts not long since declared that the flour used by the people might be pronounced practically pure. While a thoroughly competent Boston lady not long since procured twenty-four samples of flour from as many different stores, and found them all pure. Surely this is very favorable comment on the morality of millers and dealers. After all has been said on this subject, the fact remains that the chief motive for adulteration lies in a small margin or no margin for profit, and the demand by the people for an article cheaper than the cost of producing it. When people demand flour at a price less than the cost of the wheat, adulteration may be expected; when fair prices are obtainable, no miller or dealer not thoroughly depraved would risk his reputation by resorting to such artifices. The people have the whole question in their own hands. If they pay a good price they may be quite certain of obtaining a correspondingly good article.—*The Millers' National Magazine.*

THE MILWAUKEE CHAMBER OF COMMERCE.

Dedication of the Building with due Ceremonies to the Uses of the Trade.

Followed by a Grand Banquet at the Newhall House.

AN IMPORTANT EVENT IN THE HISTORY OF MILWAUKEE AND THE GRAIN TRADE OF THE GREAT NORTHWEST.

The eighteenth day of November, A. D. 1880, will long be remembered as an important date in the history of the beautiful City of Milwaukee, that day having been selected for the dedication of the new Chamber of Commerce building to the uses for which it was erected by Hon. Alexander Mitchell, one of the oldest and wealthiest citizens of Milwaukee. The Milwaukee Chamber of Commerce was founded November 22d, 1858, and the first quarters occupied by it for business purposes were on the site of what is now designated No. 1, Grand avenue. After a short period it was deemed necessary to have more commodious quarters, and Messrs. Alexander Mitchell, James S. Brown and Thomas L. Ogden erected a building for the purpose on the site of the present one, and it was dedicated to use on the evening of February 3d, 1863. When it was decided to have a new building, the business quarters of the board of trade were removed temporarily to the Munkwitz block on Broadway. We have no doubt but what the following description of this new temple of trade will be perused with interest by our readers everywhere.

The style adopted by the architect in the Chamber of Commerce is what is known as modern conventional Italian, a style well suited to buildings of this character. The idea intended to be conveyed by the design is dignity and simplicity of effect, united with bold and massive construction, in which the dependence is upon the structural details and grouping of parts, rather than the usual ornamentation usually relied on in mediocre designs for effect.

Only at the doorway is any enrichment used. The massive piers of granite at the entrance support double pillars of the same material highly polished, the capitals of which are enriched, as well as the spaces between the brackets of entablature over them, with bold, well designed, carved, conventionalized foliage. The stone lintel of the greater doorway is also richly carved, and the key of the arch that spans the doorway is also ornamented with a boldly wrought lion's head. Resting upon the granite columns of the doorway is the massive entablature, supporting a blocking course of stone, which is to form the pedestal of a figure of Commerce of heroic size, now being especially modelled in New York for this building.

In all architectural composition some one feature should be the prominent and central one from which the design radiates. The campanile, or bell tower, is the leading feature of this design. Its elegant proportions and fine effect are observable from all parts of the city. Towering above the surrounding building, 150 feet from the pavement line, it properly supports and dignifies the building, of which it is an important part. The skylines of the building are very good, being well diversified by the turreted roof termination of the four angles of the building and the central tower. The general effect of the building is massive and imposing, the parts being well grouped and symmetrical, and the use of ornament very sparing and judicious throughout.

The materials used in the construction are grey—Minnesota granite—for the basement story, while above the basement up to cornice and inclusive of it the walls are grey Amherst stone. The interior walls are of brick, stairways, railings, trusses of roof pillars and beams generally are of iron, cast or wrought according to use.

The absence of ornaments is marked throughout the exterior of the building.

The building throughout is thoroughly fireproof.

The interior partitions and walls are of brick, while the external walls are of masonry, faced inside with hollow brick, on which the plastering is placed direct, without the intervention of the usual wood finishing and lathing, so dangerous in furnishing channels for spread of fire in ordinary buildings. The isolated pillars and piers in the basement story and the great columns on main floor of the Chamber supporting stories over it are of iron, as are the roof trusses, and the general supporting beams of the building, all of which as well as the columns are covered with a matrix of fireproof terra cotta, under the Wight fire-proof process. The object of this precaution is to prevent the action of steam on the materials, as well as to lessen the liability of combustion. The staircases throughout are of iron and stone. The floor joists throughout the building are filled in with a course of brick on a flat surface set in mortar, on which the floor is built direct. These, with other precautions under the building, render the building fireproof beyond doubt, as proved by several tests during progress of the work.

The building is six stories high, including granite basement, having a total height of 100 feet from curb to cornice. The width on Michigan street is 120 feet, with a depth of 100 feet on Broadway, exclusive of alcove and restaurant addition on the south extremity of the building. The basement story, the floor of which is at the sidewalk line on Michigan street, and at most two steps lower than the top of the sidewalk on Broadway, is divided by a corridor 24 feet wide, extending from the Michigan street entrance to the south extremity of the building. This is intersected 25 feet from the front by a corridor 13 feet wide, extending from east to west, dividing front offices from rear, and on the upper floor forming the north boundary of the Chamber.

Opening off this corridor on each side are three offices—two single and one double—each with entrance from Michigan street front. These offices are 12 feet high, and have each an average floor area of about 350 feet. On the east side of the center corridor, fronting on Broadway, are four offices of about 750 feet area, while on the west side of the same corridor a room of 2250 feet area is devoted to the use of the Western Union Telegraph Company, who also occupy the double office bordering on Michigan street and alley, as a general receiving office. At the intersection of corridors in the center of the building is located the toilet-rooms for the use of basement and first floor offices.

The first story of the building, 15 feet high, is occupied largely by the Chamber, the floor of which is 12 feet from the sidewalk line, the entrance being in the centre opposite the main doorway.

A corridor extends across the building from east to west, leaving four offices on each side of the main entrance, as in the basement story on Michigan street front.

In rear of the corridor line is the Chamber of Commerce, sixty feet wide by 120 feet long inclusive of space occupied at west end by the secretary's office, directors' room, 16x24 feet, smoking room 16x20 feet, etc. The entrance to the toilet-room for the Chamber is here, also the cloak-room. Over these rooms is the visitors' gallery with private stairs from the secretary's room. On the south side of Chamber an alcove extension is provided about 26x60 feet and 25 feet in height, for speaker's rostrum and telegraph offices. This is divided by piers and arches into an arcade of three divisions, and is an effective part of the arrangement. The Chamber is 46 feet in height, occupying three stories proper of the south part of the building. The arrangement of the room is such as to give an effect of three divisions. The center division is about 60 feet square, being divided from the east division of 28x60 feet by a handsome arcade of three arches supported by two pillars and pilasters. The same arrangement at the west includes the visitors' gallery and the rooms beneath it, while the south is balanced by the speaker's alcove of three arches before mentioned. In the center of the Chamber is an ample skylight, 24 feet square, filled with rich stained glass, and the three segmented windows of large area over the speaker's desk in the south wall are also enriched in the same manner, the north wall opposite being decorated by the glowing and well-designed cartoon of Conway's allegorical painting.

The third story of the building, on Michigan street, is divided into four single and two double offices, with the same arrangement as in the lower story, which is necessitated by the central corridor which extends up through the building.

The fourth story of the building extends over the Chamber. The offices fronting on Michigan street are similar in arrangement to the lower stories, while on the Broadway and alley side of the building are provided eight offices of about 600 feet area each, and at the rear four smaller rooms. The elevated position of this story gives the offices superior light, while by means of the elevator they are equally accessible with the offices nearer the street level.

The fifth story is divided into two very large rooms and eight smaller ones, besides ample accommodations for the janitor's family and toilet rooms. This floor will be occupied mostly by the St. Paul Railway Company as offices, and will connect as well as the one below it, with the Mitchell Bank block across the alley, by means of iron bridges. The general arrangement of offices is excellent. All being amply lighted and having direct access to wide open corridors on each floor, which with the elegant central stairway gives an air of space and liberality to the whole arrangement. They are generally supplied with fireproof vaults, water, gas, open fire-places, steam radiators and all the appurtenances of comfort and convenience. All have magnetic bells, telephone and telegraph attachments, and stock and gold ticker wires in each room.

The elevator, which is located on the northwest corner of the corridor that crosses the building, is of ample size and power, being an hydraulic power machine, built by the Crane Bros.' Manufacturing Company of Chicago. Connection for business purposes will be established with the bank building adjacent on the west side, by iron bridges over the alley, on the second, fourth and fifth floors, respectively.

The building is furnished with Cook's self-cleansing water filter. The passage of the liquid through an air circulating refrigerator, by means of covered tin-lined pipes, ensures at all times an ample supply.

A feature of harmony as well as utility, pleasing to the eye and serviceable to the perception of the inmates of the new building is the tasty and appropriate character of the gas fixtures, which are of polished bronze, wrought in the Queen Ann or Medeiaval style. The arrangement of the lights in the Chamber of Commerce proper is especially convenient, being four chandeliers of six lights each, depending from the ceiling of the main compartment, in such a manner as to brilliantly illuminate the entire area of the rooms. In the end compartments are four chandeliers of four lights each, while the piers supporting the ceiling are all provided with double jet brackets. The basement and first floor offices are furnished with fixtures of porcelain and polished bronze, while in all other offices and apartments the exclusive polished bronze fixtures are used. In this regard, as in others, the Chamber of Commerce building promises to stand for years, a shining monument of mechanical and architectural skill, casting the light of its well regulated gas fixtures down the dark and misty vistas of the ages.

The glass in the building with the exception of the cathedral glass in the main skylight and windows on the south side, was imported by Harper & Son from England expressly for the new building. In order to get the glass to Milwaukee in time for use the entire body of the ornamental glass for the interior of the building was shipped by express from New York, involving a heavy additional expense. The same firm did all the painting, oil-finishing and polishing hard wood throughout the building. The peculiar style of hard wood finish employed in the building was first practiced on the Continent, and has only been in use in this country for a comparatively brief period.

The decorations are numerous and exquisite in design. Thousands of invited guests visited the opening ceremonies in the afternoon, from 3 p. m. to 7 p. m. At 8:30 p. m. the members and their invited guests, about 400 in number, sat down to a banquet in the Newhall House, across the way from the new building, and enjoyed themselves with eating, drinking, conversation and listening to a judicious amount of speech making and beautiful music. The utmost harmony and enthusiasm prevailed and the festivities did not conclude until an early hour in the morning. The Bulls and Bears take to their new quarters as readily as ducks to water, and the regular routine of business goes on with all its accustomed naturalness and vigor.

Coal Mines That Have Burned for Many Years.

The failure of all attempts to extinguish the fire which has been raging in the Keeley Run colliery, near Pottsville, Pa., for several weeks it is feared will add another to the perpetually burning mines that now exist in the Pennsylvania anthracite regions.

The greatest of these is probably that in the Jugular vein, near Coal Castle. This has been burning since 1835. Louis F. Dougherty opened this in 1833. The upper drift of the mine was above water level, and a huge fire was kept in a grate at the mouth of the mine in the winter to keep the water from freezing in the gutters. One night in the above year the timbers of the drift caught fire from the grate. When it was discovered the fire had been carried down the air-hole to the lower drifts and was beyond control, two miners entered the mine, hoping to recover their tools. They never came out. The mine was abandoned. No effort was made to mine any of the coal near the burning vein, although it was considered the best coal in the region until 1856. Then John McGinnis put in a stone on the east side of it, below water level. He struck the vein at a place where the coal was so thick that two miners could keep a large breaker supplied. When four hundred yards of gangway had been excavated the heat from the burning Dougherty mine began to bother the miners. McGinnis attempted to open an air hole. The heat became so great that the men were paid double wages to induce them to work. They worked entirely naked, and were relieved every ten minutes. Finally the heat became so intense that work was abandoned, The mine was flooded. After being pumped out men could again work for a few days, The mine was flooded nine times. McGinnis finally failed, and the mine was then abandoned. The fire has been raging in the vein ever since. An area of a mile in every direction has been burned. No vegetation grows on the surface. In places the ground has caved in, forming chasms a 100 feet deep. There is but a thin shell of earth over the pit of fire. At night blue, sulphurous flames issue from the crevices in the ground. It is dangerous to walk across the spot. Several persons have mysteriously disappeared in the vicinity during the past 20 years. It is believed that in a majority of the cases they have fallen into the burning mine. Dougherty, the original proprietor of the mine, attempted to go across once. He sank to his arm-pits through the crust, and was only saved by courageous friends who ventured to his assistance. The stones on the ground are hot, and snow never rests there. Rain turns to vapor as fast as it falls on the roof of the burning mine. Millions of dollars' worth of the best quality of coal have been consumed by the fire.

The Summit Hill mine, near Mauch Chunk, has been burning for twenty-five years. It is believed that this mine was set on fire by discontented miners. Thousands of dollars have been expended in fruitless efforts to extinguish the flames.

The Butler mine, near Pittston, has been burning three years. It was set on fire by a party of tramps, who built a fire in the mine in 1877. The fire is in the upper drifts. It is confined to an area of forty acres by an immense ditch forty feet wide, which was excavated between the burning drift and connecting ones. The digging of the canal cost $50,000. But for that obstacle the fire would have communicated to some of the most extensive mines in Lackawana valley, and a subteraneous conflagration would have swept under the whole of West Pittston. Miners have worked in the lower drift of the Butler mine since the fire broke out, but there are forty feet of rock between them and the field of fire above. The water that trickles through the roof is scalding hot. The temperature is so high that the men can wear but little clothing.

Steam vs. Water-Power Mills.

The motive power by which the machinery of the St. Louis mills is driven is steam. Coal for that purpose is, of course, abundant and cheap. In other respects there is no material advantage possessed by the flour manufacturers of St. Louis that may not be acquired in Winona. Indeed, recent experience has demonstrated not only that coal may be obtained in this city at rates but little above those prevailing in St. Louis, but that steam as a motive power is in the end cheaper and more reliable than water. There may be exceptions, but the history of water-powers in Minnesota, as compared with that of steam as a propelling power for mill machinery, proves this to be the rule. But for the generosity of the general government in expending large sums of money in the "improvement" of the Falls of St. Anthony for the benefit of private interests, the cost of erecting mills in that city and maintaining the water-power in efficient order would have ruined the owners. Except in certain peculiarly favored instances, as we have intimated, water is a far more uncertain element than steam. Mill-dams are usually expensive to construct, and when constructed they are continually liable to serious breaks if not to complete destruction. The supply not infrequently becomes exhausted or inadequate just at a time when its use is the most desirable and of the greatest value. Steam, on the other hand, can be depended upon almost with the certainty that attends the movements of the sun. It is not only an obedient servant, but, in effect, a never-failing one. Thus, as regards the two essential considerations of cost and reliability, the owner of the steam flouring mill has, on the whole, the advantage of his competitor who depends upon the running stream.—*Winona (Minn.) Republican.*

LEGAL DEPARTMENT.

The Denchfield Case.

A Decision Adverse to the Millers.

CIRCUIT COURT OF THE UNITED STATES FOR THE NORTHERN DISTRICT OF NEW YORK.

Lemuel W. Bignall, vs. *Horace J. Harvey and Francis J. Henry.*

BLATCHFORD, J.—This suit is brought on reissued "letters patent granted to John Deuchfield, January 16, 1872, for fourteen years from April 20, 1858, for an improvement in cooling and drying meal." It is the same patent which was the subject of the suit in Herring vs. Nelson (14 Batchf. C. C. R. 293). In that case, after full consideration, the reissued patent was sustained against the objections that it was not for the same invention as the original patent; that new matter has been introduced into the specification of the reissue contrary to the statute; and that the patentee was not the first inventor of what is claimed in the first claim of the reissued patent.

The defendants in the present case do not ask for a review or reconsideration of any of the specific questions disposed of in the former case. But two new matters are brought up on the question of novelty. One is a patent granted in England December 18, 1853, to Joseph Robinson. The other is an addition granted July 31, 1840, to a French patent granted April 21, 1837, to one Cartier.

The Robinson patent cannot be held to be an anticipation. It is clear from the drawings of the plaintiff's patent that the curbs of the mills are open curbs, as distinguished from close curbs, that is, are the open curbs which were in general use in American mills at the time. Open curbs are curbs or covers over the upper mill-stone, provided with a circular opening over the eye of the upper stone. This enables the air in the plaintiff's arrangement to pass over the top of the upper stone, and through the annular space between the outer edges of the stones and the inside of the curb and thence, with the meal, through the closed meal spouts into and through the closed meal chest. In the Robinson patent, the small orifice in the center of the top of the curb is tightly stopped up by a tube which extends downward into the eye of the upper stone, the outside of the tube fitting into the interior of the eye. The object must have been as the necessary operation was, to prevent the passage of air over the top of the upper stone, inside of the curb, and to force it to go down into the eye and between the grinding faces of the stones. Thus the operation is the reverse of that in the plaintiff's patent. Moreover, Robinson has no current of air traversing the length of the meal chest and carrying of the moisture which rises from the meal as the screw conveyor operates upon it. The elements combined in Robinson are not there combined in the same way as in the plaintiff's patent to produce the same result by the same mode of operation.

As to the Cartier arrangement, which is the one most earnestly pressed, I have examined with care all the evidence in regard to it. It would be unprofitable to discuss such evidence minutely. It is sufficient to say that the description and drawings of Cartier do not furnish such clear and definite information as to enable a skilled person, beyond any reasonable doubt by following them, without aid from anything not known when they were made, to construct an apparatus like the plaintiff's. They do not meet the requirement of law in regard to what is necessary in a prior description and drawings, to defeat a subsequent patent. They are neither full nor clear, nor exact.

The only other point urged in defense is that the original patent was granted to John Deuchfield and that the reissue is to John Deuchfield, and is therefore void. The reissued patent states that the original was issued to "him," that is, John Deuchfield, that it has been surrendered and cancelled, and that a new patent has been ordered to issue to "him." The plaintiff has put in evidence a certificate of extension, which states that on the petition of John Deuchfield "for the extention of the patent granted to him April 20, 1858, and reissued January 16, 1872, it is extended for seven years from April 20, 1872." An original patent is in evidence which was granted to John Denchfield April 20, 1858, for fourteen years from that day, and there is no dispute that that is the patent which was surrendered when the reissued patent to John Deuchfield was granted, and that no original patent was granted to John Deuchfield unless the one so granted to John Denchfield was one. The real name of the man was Denchfield. The mistake was, clearly, one made in the Patent Office, a clerical and accidental mistake, in taking the letter *n* to be the letter *u*.

The defendants did not, at any stage of the taking of the proofs in the cause, raise any question as to the identity of the person to whom the reissue was granted with the original patentee either when the documentary proofs were being put in or when the oral testimony was being taken. In the defendants' proofs, the questions to their witnesses and the answers thereto refer to the reissue as having been granted to John Denchfield, and as having been granted to the same person to whom the patent of April 20, 1858, was granted. If the point had then been suggested, doubtless the plaintiff would have proved in fact the identity of John Deuchfield. Such identity seems to have been shown in Herring vs. Nelson, the evidence in which case is made part of this case by stipulation and notice. The question is one of identity merely. (Janes vs. Whitbread, 11 C. B. 406; Jackson vs. Boneham, 15 Johns. 226; Jackson vs. Cody, 9 Cowen, 140). The defendants gave no evidence to show that there was any such person as John Denchfield or that the reissue was not intended to be issued or was not in fact issued to the same person to whom the original patent was granted. Indeed, there is sufficient in the proofs, in the evidence given by the plaintiff as a witness, to show that the person to whom the original patent was granted, and whose name was John Denchfield, was the person to whom the reissue was granted. Such proof is always competent in a case like this (Jackson vs. Stanley, 10 Johns. 133; see Northwestern Fire Extinguisher Co. vs. Philadelphia Fire Extinguisher Co., 6 Off. Gaz. of Pat. Office, 34).

Infringement of the first claim of the reissue is proven and not contested. As the patent has expired there can be no injunction, but the plaintiff is entitled to the usual decree in other respects, in regard to said first claim.

BENJAMIN F. THURSTON &
EDWIN S. JENNY,
For the Plaintiff.
GEORGE HARDING &
GEORGE B. SELDEN,
For the Defendants.

The same decision is made in the cases of the same plaintiff against Thomas Elwood and others, Henry Rodee and others, and Sidney R. Brown and others.

TAXING CORN IN TRANSIT.—A case of interest to grain buyers and counties in Illinois was heard before the Federal court in Chicago recently. A large amount of corn has been bought for shipment and placed in cribs at Dennison, on the Chicago & Northwestern Railroad. It remained in the crib two years, and, without the advice of the State Auditor, the Assessor was directed to assess it for taxation. The tax amounted to $550, which the owner did not pay, and a levy was made by the sheriff on the corn, when the owner paid the tax under protest. He then brought an action in the Federal courts, being a non-resident, to recover the amount of tax paid, and sets up that the corn was in transit, and therefore not taxable. As the State is directly interested in the matter, the Attorney-General appeared as counsel for defense. Should the county gain the case there will be a lively hustling of old corn from this State. There are millions of bushels 2-years old now in the State.

Millers' Law in Wisconsin.

CONCERNING MILLS AND MILL-DAMS.—CHAPTER CXLVI.

[*Continued from November Number.*]

SECTION 3390. The execution issued on such judgment, if not otherwise satisfied, may at any time within ninety days after the judgment is rendered, be levied on the premises so subject to the lien, and the same may be sold by virtue thereof, or so much thereof as may be necessary to satisfy such execution, and all costs and charges thereon.

SEC. 3391. The officer making such sale shall make and subscribe, file and deliver, duplicate certificates thereof, in the form prescribed upon the sale of real estate upon executions, in other civil actions, except that he shall insert therein that the time when such sale will become absolute, and the purchaser will be entitled to a conveyance thereof, will be one year from the date of such sale.

SEC. 3392. Any person entitled to the premises sold may redeem the same at any time within one year after such sale, upon paying to the purchaser, his personal representatives or assigns, or to the sheriff of the county, for his use, the sum paid therefor, with interest thereon at the rate of twelve per cent. per annum.

SEC. 3393. If the premises so sold shall not be redeemed within said year, the officer making the sale or the then sheriff of the county, shall complete such sale by executing a conveyance to the purchaser, his personal representatives or assignee; which conveyance shall be valid and effectual, to convey all the right, title and interest of all persons having or claiming title to such premises, at any time within the time covered by such lien.

SEC. 3394. When either party shall be dissatisfied with the annual compensation established by any verdict of a jury under the provisions of this chapter, a new action may be brought for the increase or diminution of such annual compensation, or for ascertaining the gross amount of damages, and all the proceedings in such action shall be conducted substantially in the manner before provided in the case of an original action; but when any plaintiff shall have declined to accept the amount of gross damages awarded him, no jury shall again determine the amount of gross damages until the expiration of ten years thereafter.

SEC. 3395. Such new action may be maintained by and against either of the parties to the original action, or by or against any person lawfully holding under either of them, respectively, as the case may require.

SEC. 3396. No such new action shall be brought within one month after the payment of the then last year shall have fallen due; and either party may, within the said month, make an offer or tender to the other, as provided in the next section.

SEC. 3397. The owner of the mill or dam may offer in writing to the owner of the land injured, any increase of the annual compensation as fixed by the last verdict, and if the owner of the land does not agree to accept the same, but brings a new action to obtain an increase thereof, he shall not recover costs, but shall pay costs to the adverse party, unless he shall obtain a verdict for a greater annual compensation than was offered to him. The owner of the land injured may offer in writing to the owner of the mill or dam to accept any smaller sum than that last established as the annual compensation, and if the owner of the mill or dam does not agee to pay such reduced compensation, but brings a new action to obtain a diminution thereof, he shall not be entitled to costs, but shall pay costs to the adverse party, unless the annual compensation shall be reduced by the verdict to a sum less than that which was offered him.

SEC. 3398. Such offer may be made by or to the respective tenants or occupants of the land, and of the mill or dam in question, in like manner and with like effect, as if made by or to the respective owners, except that no agreement founded thereon shall bind the owners, unless it be made with their consent.

SEC. 3399. If the offer is made by either party is agreed to and accepted by the other, it shall establish the annual compensation to be thereafter paid in like manner as if it had been established by a verdict and judgment in a new action: provided, that a memorandum of such offer and acceptance, and of the agreement thereupon, be made and signed by the respective owners of the mill or dam and of the land, or by persons duly authorized by them, and filed and recorded in the clerk's office of the court in which the former judgment was rendered, with a note of reference on the record of the former judgment, to the book where the agreement is recorded.

SEC. 3400. The verdict in any action under this chapter may be set aside and a new trial ordered as in other cases, and an appeal may be taken from any final judgment rendered therein, in like manner and with like effect as in other civil actions.

SEC. 3401. No such action shall abate by reason of the death of any party thereto, but the same may be prosecuted or defended by the surviving plaintiffs or defendants, or by the executors or administrators of the deceased, and if any such action shall be abated or otherwise defeated for any matter of form or failure to acquire jurisdiction, the plaintiff, or any person claiming from, by or under him, may bring a new action for the same cause, at any time within one year after such abatement or other determination of such original action, and may in such new action recover such damages as shall have been sustained during the three years before the commencement of such original action or at any time afterwards.

SEC. 3402. The provisions of this chapter shall extend to all cases where compensation has not been made for damages sustained by reason of the erection or maintenance of any such mill dam; to all cases where the owner or occupant of a mill or dam makes any material change, by raising the dam or altering the machinery, or the manner of using the water, so as to cause additional damage to the land of another, and to all cases of new action brought for the purpose of increasing or diminishing the annual or gross damages which may have been heretofore determined by a jury under the provisions of law.

JOINT OWNERS OF MILL-DAMS, BOOMS AND PIERS MAY COMPEL REPAIRS

SEC. 3403. Whenever two or more persons shall own jointly, or as tenants in common, or in severalty, either legally or equitably, any mill-dam or booms or piers necessary to the enjoyment of any mill to which they are appendages, in the absence of any written agreement between the owners thereof providing for keeping in repair and maintaining the same, such owners shall keep in repair and maintain the same proportionably to their interests, or such portion thereof as belongs to them respectively in severalty; and whenever in the opinion of any such owner, any such mill-dam, boom or piers needs repairs, and such co-owner shall neglect or refuse, after five days' notice in writing, to commence such repairs and prosecute the same with reasonable diligence, the party giving such notice may make such repairs and recover of the party so neglecting or refusing to make the same, in the manner hereinafter provided, unless the owners upon whom such notice is served shall, within five days after the service thereof, notify, in writing, the owner, giving such notice that they have abandoned such dam, piers or booms, and claim no further interest therein; in which case the owners receiving such notice of abandonment may take full possession of and make the necessary repairs to such dams, booms or piers, and thereafter hold and enjoy the same as their sole property. Such notices may be served in the same manner as a summons in a civil action in a court of record.

SEC. 3404. When any such owner shall neglect or refuse to make such repairs, after the giving of such notice, and shall not have given such notice of abandonment, the owner or owners giving such notice and offering to do their portion of such needed repairs, may apply to a justice of the peace of the county in which such dam, boom or piers are situated, by complaint in writing, duly verified, setting forth the interests of the different owners in such dam, boom or piers, and the notice given any defaulting owners, and thereupon such justice shall issue a summons in favor of such complainants, as plaintiffs, and against such other owners as defendants, directed to the sheriff or any constable of the county, commanding him to summon such defendants, and also six disinterested freeholders of the county as a jury, to meet at such dam, boom or piers on a day and hour therein named, not less than three nor more than six days from the time of the service of such summons upon the defendants, and make due return thereof to the justice who issued the same.

SEC. 3405. At the time and place mentioned in said summons, said jurors shall appear, and the justice shall also be present, and in case any person summoned as such juror shall not appear, or shall be interested or incompetent to act from any other cause, the justice shall issue a special venire to the sheriff or a constable of the county, requiring him to summon forthwith a sufficient number of disinterested free-holders of the county to make up such jury. When a jury shall have appeared, they shall be sworn by the justice faithfully to discharge the duties as such jurors, and thereupon they shall examine such dam, booms or piers, and may hear the parties and any witnesses offered by them, and shall determine what, if any, repairs are deemed necessary to be made, the time within which the same shall be commenced and completed, and a fair estimate of the costs and expenses of making such repairs, and the proportions thereof to be made by each of the parties named in such summons, all of which shall be reduced to writing and signed by the said jury and delivered to the justice. In case the jury shall have determined that any repairs on such dams, booms or piers are necessary, and that any portion thereof ought to be made by the defendants, the justice shall render judgment against such defendants, requiring them to make such repairs in the manner and within the time fixed by said jury, and for the costs of the action to be taxed as in other cases. If the jury shall have determined that no such repairs are necessary, judgment shall be rendered against the plaintiff for the costs of the action to be so taxed; and in either case execution shall issue thereon for such costs.

SEC. 3406. If any party against whom a

judgment shall have been rendered, requiring him to make repairs upon any such dam, boom or pier, shall neglect to make the same as required by such judgment, the other party may make such repairs and recover of the party so neglecting the full amount of the cost and expense thereof as estimated by the jury, and in addition thereto the sum of twenty-five per cent. per annum upon the amount of such estimate and expense, to be computed from the time when such repairs shall have been directed to be completed by the determination of such jury.

A Miller's Brother.

The following pretty story is told of General Baur who commanded the Russian cavalry in Holstein. He was a soldier of fortune, whose family and country were unknown to every one. When encamped near Husum he took a mode of discovering himself, as novel as it was amiable. He invited all his field officers and some others to dine with him, and sent his adjutant to bring a miller and his wife who lived in the neighborhood to the entertainment. The poor couple came, very much afraid of the summons, and quite confused when they appeared before the Muscovite General. Baur seeing this, bade them be quite easy, for he only intended to shew them kindness, and had sent for them to dine with him that day; at the same time he conversed familiarly with them about the country. At dinner the General placed the miller and wife one on each hand, and nearest to him and paid particular attention to them. In the course of the entertainment he asked the miller many questions about his family and relations. The miller stated that he was the eldest son of his father, who left the mill he then possessed, and that he had two brothers and one sister. "Have you no other brother?" asked the General. "No," replied the miller, "I once had another brother, but he went away with the soldiers when he was very young, and must have long ago been killed in the wars." The General observing the company much surprised at his conversation with the miller, said to them: "Brother soldiers, you have been curious to know who I was, and whence I came. I now inform you that this is the place of my nativity, and you have heard from this miller, who is my eldest brother, what my family is." Then turning to the astonished miller and his wife, the General embraced them, saying that he was the brother they had supposed dead. The General then invited the whole of the company to meet him next day at the mill, where a splendid entertainment was provided, the General pointing out to his brothers in arms the room in which he was born, and with as much evident joy as if he had been shewing them the place where he had gained a victory.

New York Canal Business During 1880.

The receipts of grain and flour reduced to wheat at Buffalo from the opening of navigation to the present time, according to *The Buffalo Commercial Advertiser*, amounted to about 100,000,000 bushels, which is about 50 per cent. more than last year, and about 37 per cent. more than for any preceding year. This, says *The Advertiser*, exceeds the grain business of any other city in the world, and, notwithstanding the magnitude of the receipts, they were stored, transferred and forwarded without inconvenience or delay. The larger part of this grain was forwarded East by canal, the amount so shipped being 63,278,404 bushels, against 46,845,194 bushels last year, and 53,238,725 in 1878, and this was put through without any glut or blockade on the canal or at Buffalo. Better rates of freight have been obtained than during the season of depression previous to 1879, but they were lower than last year, and not above a fair remunerative figure. The lake freight for the month of October averaged 6.8 cents per bushel for wheat, and 6.3 cents for corn, against 7.7 cents and 7.1 cents respectively last year. The canal rate for the same time was 6.7 cents per bushel for wheat and 6 cents for corn, against 9 cents for wheat and 7.9 cents for corn last year. More grain was received in October than any other month, the amount being 16,186,000 bushels. The shipments by canal for the season included, in round numbers, 18,000 barrels flour, 26,500,000 bushels wheat, and 25,250,000 bushels corn, against 3,863 barrels flour, 25,100,000 bushels wheat, and 19,000,000 bushels corn last year. To have transported the 63,250,000 bushels of grain and 18,000 barrels of flour by rail would have taken thirty-five trains of twenty cars each per day for six months, including Sundays.

The Crops of 1880 in the United States.

Mr. Charles Worthington, statistician of the department of agriculture, has completed his final investigation and compilations in regard to the wheat crop of the United States for 1880, a detailed statement of which, by states, is as follows:

States.	1880, bus.	1879, bus.
Maine	383,135	488,688
New Hampshire	204,525	195,529
Vermont	520,096	463,924
Massachusetts	15,606	15,354
Connecticut	42,720	39,348
New York	12,931,237	10,746,660
New Jersey	2,473,974	1,784,115
Pennsylvania	22,299,090	22,307,245
Delaware	1,369,040	1,012,584
Maryland	7,485,800	6,999,696
Virginia	9,322,350	8,851,007
North Carolina	3,470,080	3,223,336
South Carolina	690,720	1,140,400
Georgia	2,582,370	3,616,920
Alabama	946,620	1,591,592
Mississippi	374,000	417,312
Texas	3,901,500	3,454,200
Arkansas	1,167,600	1,334,000
Tennessee	9,309,600	11,852,640
West Virginia	4,651,140	4,350,580
Kentucky	5,347,120	7,681,520
Ohio	37,792,800	36,591,360
Michigan	30,705,000	28,773,120
Indiana	38,341,990	43,709,148
Illinois	53,767,200	44,896,830
Wisconsin	16,464,000	20,565,468
Minnesota	40,752,000	31,887,135
Iowa	36,098,400	32,787,043
Missouri	30,688,000	26,802,300
Kansas	19,850,000	18,089,060
Nebraska	10,208,000	13,043,703
California	45,760,000	35,000,000
Oregon	12,920,000	8,188,800
Other states and territories	18,005,000	16,900,000
Total bus.	480,849,723	448,755,118

The following compilation will show at a glance the comparative yield in the several general divisions of the country, in bushels:

	1880.	1879.
New England states	1,167,092	1,196,843
Decrease	29,751	
Middle states	39,073,341	35,850,605
Increase	3,222,736	
Southern states	49,256,900	54,473,703
Decrease	5,216,803	
Western states	314,667,390	297,145,167
Increase	17,522,223	
California and Oregon	58,680,000	43,188,800
Increase	15,491,200	
Other states and territories	18,005,000	16,900,000
Increase	1,105,000	

The increase in the crop compared with 1879 is 32,094,603 bus.

The corrected information in regard to acreage of wheat for 1880, in the United States, shows 36,037,950 acres, against 32,835,909 in 1879. The yield per acre for 1880 is 13.3 bus., against 13.7 in 1879; 13.1 in 1878, 13.9 in 1877. Previous to 1877 the general average for fifteen years was 12.2.

The figures given by the bureau of statistics indicating the amount of wheat remaining for domestic consumption, per capita, for several crop years, compare as follows: 1878–9, 6.03 bus.; 1877–8, 6.09; 1876–7, 5.34; 1875–6, 5.23; 1874–5, 4.79, etc. In this reckoning the flour exports are not taken into consideration—and thus the amount stated per capita includes wheat consumed at home for seeding, flour, etc., and also covering the amount of flour exported. For the year ending June 30, 1880, the flour exports were equivalent to 27,051,375 bus. of wheat; preceding year equivalent to 25,333,713 bus.

The annual production of wheat in the United States, the exports of wheat, including flour, and the remaining supply for domestic uses, compare for five years, each ending June 30, as follows:

	Production, bushels.	Exports, bushels.	Remaining, bushels.
1875-76	292,136,000	74,750,682	217,385,318
1876-77	289,356,300	57,043,935	232,312,364
1877-78	364,194,146	92,189,236	272,054,910
1878-79	420,122,400	147,687,649	272,434,751
1879-80	448,755,118	180,304,168	268,450,950

If the domestic requirements shall be 275,000,000 bus. during the current year, there will remain 205,000,000 bus. for export, or 25,000,000 more than in the preceding year.

In a book laid before the chamber of commerce of New York recently by Mr. L. B. Ruggles, it is shown that in the United States there has been a growth in cereal products from 615,000,000 bus. in 1840 to 802,000,000 in 1850; 1,238,000,000 in 1860, 1,387,000,000 in 1870, 2,178,000,000 in 1877, and 2,431,000,000 in 1879. The annual product increased from $3,965,000,000 in 1850 to $7,977,000,000 in 1860, and $11,000,000,000 in 1870, yielding, after paying for labor and wages, a net amount of $2,170,000,000, being nearly 20 ⅌ cent. on the value of $11,000,000,000. The book states that this immense product is derived from 480,000,000 acres of land north of the Ohio river, which, after deducting 80,000,000 acres not immediately available, would leave 400,000,000 acres, which could produce in wheat or other equivalent cereals at least 4,800,000,000 bus. annually to meet the demands of a greatly-increased population.

Germany annually consumes 7,300,000 tons of rye, the staple food of the working classes being rye bread. The average rye crop is 6,200,000 tons, but this year it is only 5,200,000, so that the country must import 2,100,000 tons, cost 357,000,000 marks, or $89,220,000. The import duties on this rye are 21,000,000 marks, or $5,000,000, a direct tax on the necessaries of life of the poorest people. The 5,200,000 tons produced at home are also proportionally enhanced in price.

How to Set a Turbine.

The following are the simplest and best rules for the setting of turbines that we have ever seen, having been arranged by Mr. A. N. Wolff, a water-wheel inventor and millwright, so that any millwright can understand them:

At the beginning let us consider some essential points regarding the proper mode of preparing the wheel site.

1. The cross section of the canal or head-race should contain, in square feet, at least one square foot for every fifty cubic feet of water used per minute by the wheel (or wheels, if there are more than one). Example: You use by your mill, 2,500 cubic feet of water per minute, your head-race should have a cross-section area of fifty square feet, or it should be about ten feet wide and five feet deep. This will give you a flow of something less than one foot per second of current in head-race. Your fore-bay should contain a cross-section of one square foot for each sixty cubic feet used per minute. With this proportion of inlet capacity your head of water will keep up to the standard point, and the full effect will be produced, due from the head.

2. Your tail-race, measuring from the standing surface of tail water down to the regular race bottom, should have a cross-section of fully one-third of that due to the head-race, or one square foot for each 150 cubic feet per minute used by the mill.

Rule 1.—Water-wheel pit should be dug down to such a depth as to allow the depth of tail water to be fully three-fourths the diameter of the wheel.

[NOTE.—In case of clay or gravel formation, substantial mud-sills should be laid, covering the entire pit (laid close together). These sills being perfectly level, must be floored over with plank not less than two inches thick—a double floor is even better. Upon this floor you place your pillars to support your pen-stock sill; in case of sand formation you should, in addition to rendering the floor perfectly tight, build up with substantial planks a tight curbing around and on the floor to prevent the sliding of the bank formed by the excavation. This renders your mill foundations safe from undermining and settling. Do not slight your work in any of the above points.]

Rule 2.—The distance from the lower edge of the draft cylinder of the wheel down to the pit floor should not be less than two-thirds the diameter of the wheel.

Rule 3.—The discharge room for water from the pen-stock should have under the sill an area measurement of one square foot for each one hundred cubic feet of water used per minute.

Rule 4.—Sills of pen-stock must be of good, sound, durable timber, of ample size, and well framed together, and when placed must be properly level and solid.

Rule 5.—The pen-stock should never be smaller in the square than three times the diameter of the wheel. The larger the pen-stock is made the better, however. For wheels above forty-eight inches twice the diameter is large enough for pen-stock.

Rule 6.—The pen-stock must be supported by proper pillars of wooden blocks or good stone, holding the sills in a permanently level position.

Rule 7.—The mud-sill or under foundation must be of a most secure and permanent nature, allowing no chance whatever for any under settling or any possibility of being undermined.

Rule 8.—I come now to floor of pen-stock. Heavy trimmers of good, stout timber must be neatly framed in bands across between the sills to receive the floor.

Rule 9.—The floor of the pen-stock must be well and tightly laid with thick plank (from 2½ to 4 inches). The plank should be broad, say 18 to 24 inches.

Rule 10.—The hole for the wheel draft cylinder must be cut through this floor (between trimmers) of a diameter one inch larger than the cylinder measure to allow for adjusting wheel.

Rule 11.—Use extra care to plane off the curb of this hole until it is perfectly level, so that the wheel may set exactly level when it is in place.

Rule 12.—Be careful in adjusting the followers at top of dome, that you do not get them too tight. They must be set up by the set screws carefully, so that the shaft stands perfectly upright and easy.

Rule 13.—In setting your transmitting shaft too much care can not be exercised in getting it perfectly plumb; also resting properly in the box above. Notice that the coupling at the wheel is put together according to the marks made upon it.

The Just Judge in the Guise of a Miller.

A gentleman who possessed an estate worth about five hundred a year, in the eastern part of England, had two sons. The eldest being of a rambling disposition, went abroad. After several years, his father died; when the younger son, destroying his will, seized upon the estate. He gave out that his elder brother was dead, and bribed false witnesses to attest the truth of it.

In the course of time, the elder brother returned; but came home in destitute circumstances. His younger brother repulsed him with scorn, and told him that he was an imposter and a cheat. He asserted that his real brother was dead long ago; and he could bring witnesses to prove it. The poor fellow, having neither money nor friends, was in a sad situation. He went round the parish making complaints, and, at last, to a lawyer, who, when he had heard the poor man's story, replied, "You have nothing to give me. If I undertake your cause and lose it, it will bring me into disgrace, as all the wealth and evidence are on your brother's side.

"However, I will undertake it on this condition; you shall enter into an obligation to pay me one thousand guineas, if I gain the estate for you. If I lose it, I know the consequences; and I venture with my eyes open." Accordingly, he entered an action against the younger brother, which was to be tried at the next general assizes at Chelmsford, in Essex. The lawyer, having engaged in the cause of the young man, and being stimulated by the prospect of a thousand guineas, set his wits to work to contrive the best method to gain his end. At last, he hit upon this happy thought, that he would consult the first Judge of his age, Lord Chief Justice Hale. Accordingly, he hastened up to London, and laid open the cause, and all its circumstances. The Judge, who was a great lover of justice, heard the case attentively, and promised him all the assistance in his power. The lawyer having taken leave, the Judge contrived matters so as to finish all his business at the King's Bench, before the assizes began at Chelmsford. When within a short distance of the place, he dismissed his man and horses, and sought a single house. He found one occupied by a miller. After some conversation, and making himself quite agreeable, he proposed to the miller to change clothes with him. As the Judge had a very good suit on, the man had no reason to object. Accordingly, the Judge shifted from top to toe, and put on a complete suit of the miller's best. Armed with a miller's hat, and shoes, and stick, he walked to Chelmsford, and procured good lodging, suitable for the assizes, that should come on next day. When the trials came on, he walked like an ignorant country fellow, backward and forward along the county hall. He observed narrowly what passed around him; and when the court began to fill, he found out the poor fellow who was the plaintiff. As soon as he came into the hall, the miller drew up to him. "Honest friend," said he, "how is your cause like to go to-day?" "Why, my cause is in a very precarious situation, and, if I lose it, I am ruined for life." "Well, honest friend," replied the miller, "will you take my advice? I will let you into a secret, which perhaps you do not know: every Englishman has the right and privilege to except against any one juryman out of the whole twelve; now do you insist upon your privilege, without giving a reason why, and, if possible, get me chosen in his room, and I will do you all the service in my power." Accordingly, when the clerk had called over the names of the jurymen, the plaintiff excepted to one of them. The judge on the bench was highly offended with this liberty. "What do you mean," said he, "by excepting against that gentleman?" "I mean, my lord, to assert my privilege as an Englishman, without giving a reason why." The judge, who had been highly bribed, in order to conceal it by a show of candor, and having a confidence in the superiority of his party, said, "Well, sir, as you claim your privilege in one instance, I will grant it. Whom would you wish to have in the room of that man excepted?" After a short time, taken in consideration, "My lord," says he, "I wish to have an honest man chosen in;" and looking round the court, "my lord, there is that miller in the court; we will have him, if you please." Accordingly, the miller was chosen in. As soon as the clerk of the court had given them all their oaths, a little dextrous fellow came into the apartment, and slipped ten golden guineas into the hands of eleven jurymen, and gave the miller but five. He observed that they were all bribed as well as himself, and said to his next neighbor, in a soft whisper, "How much have you got?"

"Ten pieces," said he. But he concealed what he had got himself. The cause was opened by the plaintiff's counsel; and all the scraps of evidence they could pick up, were adduced in his favor. The younger brother was provided with a great number of witnesses and pleaders, all plentifully bribed, as well as the judge. The witnesses deposed, that they were in the self-same country when the brother died, and saw him buried. The counsellors pleaded upon this accumulated evidence; and every thing went with a full tide in favor of the younger brother. The judge summed up the evidence with great gravity and deliberation; "and now, gentlemen of the jury," said he, "lay your heads together, and bring in your verdict as you shall deem most just." They waited but for a few minutes, before they determined in favor of the younger brother. The judge said, "Gentlemen, are you agreed? and who shall speak for you?" "We are all agreed, my lord," replied one, "and our foreman shall speak for us."—"Hold, my lord," replied the miller; "we are not all agreed." "Why?" said the judge, in a very surly manner, "what's the matter with you? What reasons have you for disagreeing?" "I have several reasons, my lord," replied the miller: "the first is, they have given to all these gentlemen of the jury, ten broad pieces of gold, and to me but five; which, you know, is not fair. Besides, I have many objections to make to the false reasonings of the pleaders, and the contradictory evidence of the witnesses." Upon this, the miller began a discourse, which discovered such a vast penetration of judgment, such extensive knowledge of law, and was expressed with such manly and energetic eloquence, that it astonished the judge and the whole court. As he was going on with his powerful demonstrations, the judge, in great surprise, stopped him. "Where did you come from, and who are you?" "I came from Westminster Hall," replied the miller; "my name is Mathew Hale; I am Lord Chief Justice of the King's Bench. I have observed the iniquity of your proceedings this day; therefore, come down from a seat which you are nowise worthy to hold. You are one of the corrupt parties in this iniquitous business. I will come up this moment and try the cause all over again." Accordingly, Sir Mathew went up, with his miller's dress and hat on, began the trial from its very commencement, and searched every circumstance of truth and falsehood. He evinced the elder brother's title to the estate, from the contradictory evidence of the witnesses, and the false reasoning of the pleaders; unraveled all the sophistry to the very bottom, and gained a complete victory in favor of truth and justice.

Duties of Apprentices.

The duties of apprentices to their employers are so patent and well known as to require no remarks from the writer. But the duties of apprentices to themselves and their opportunities, for their own development, are worthy some attention. It is not enough that the apprentice should attend to his work during working hours—he has not filled his opportunities when he merely fills with labor the hours devoted to shop work. One who is content with this force service; this bare fulfilment of contract duty, his small encouragement to look forward to eminence in his business. The apprentice should determine, from the start, to become a first-class workman. If he has any taste for his chosen trade there is no insurmountable difficulty in the way of his ultimate success. But to accomplish it requires something more than mere attention and industry confined to the shop hours. If he is content to get through his day's work with the commendation of his employer, and looks for and cares for nothing more, he will probably leave the shop, at the end of his novitiate, an ordinary workman, and remain so to the end of the shapter.

There are many processes and manipulations in the shop that can be successfully and profitably performed only after long-continued and faithful practice. In the machinist's business, as an instance, it requires long practice to draw a file properly. In joiner work it exacts much perseverance and many trials to make a good joint, even to set a plane iron, or to drive a finishing nail home and leave no hammer mark. The writer, as a machinist's apprentice, found great difficulty in drawing a file property. In spite of his judgment and in contradiction to the requirements of the straight-edge, he would swing instead of draw the file, leaving the work convex instead of straight. By constant practice at noonings and before "bell time" in the mornings, he became an adept and required no straight-edge to test its accuracy. But this success was gained only after long practice, during which it seemed, sometimes, that natural habit was too strong for the necessities demanded by new acquirements. There is one great satisfaction, however, in such a lesson; it is never forgotten. So long as the muscles obey the will, so long will the old machinist do straight work with the file when it is demanded. The apprentice should adopt and act up to the maxim. "What is worth doing is worth doing well."

The skill acquired in practice is, in itself, a valuable acquisition; but, when joined with intelligence and a knowledge of the basis of practice, gives the possessor a superiority that at once distinguishes him from the common workman, whose ambition through life has been merely to get through the week and reach his weekly stipend. Skill of handiwork alone is worth striving for. Picking up, a few days ago, one of a heap of shoe-knife blades from the back of an anvil at which a forger was at work, its smoothness was remarkable. Not a mark on the blade showed that it had been formed by repeated blows of a hand hammer; it resembled in its smoothness a finished article, discolored only with the necessary oxide of heating. This man received for his work just twice what the ordinary forger obtained, owing entirely to his skill in manipulation.

But there is still a higher grade of mechanic; that where the workman sees the job from beginning to end; can lay out the work, direct the processes, and decide on its accuracy. Some technical and theoretical knowledge is necessary to achieve this result. A knowledge of arithmetic is indispensible. It should be thorough, including algebra, and some acquaintance with the higher branches of mathematics. Natural philosophy is an aid to excellence in mechanics. Geometry and the practice of mechanical drawing are advisable. Grammer is not to be despised. The mechanic and the engineer must often be required to state, in terms, his ideas, and can not always depend on sketches or similar illustrations. All these acquirements are within the compass of the apprentice's time and opportunities. And there are hand-books to be studied and treatises to be read to aid in forming a character of the first-class mechanic and books of reference to be kept at hand. With a diligent use of these means, and a judicions employment of his opportunities, there is no immovable obstacle to the rise of the apprentice to the top of his profession.—*Boston Journal of Commerce.*

Rebuking a Juryman.

"I once heard this ancedote about Judge Parsons," said the Rev. James Freeman Clarke, the great Massachuseits advocate and lawyer. It is said that being about ready to try a mercantile case, he ordered a jury to be summoned, and among the names that of Mr. Thomas H. Perkins, the leading merchant of Boston, and a personal friend of Judge Parsons. When the officer made his return he laid down a $50 bill before the judge.

"What is this for?" asked Parsons.

"Mr. Perkins says he is very busy to-day, and prefers to pay his fine."

"Take that back to Mr. Perkins," said the judge, "and tell him to come at once, and, if he refuses, bring him by force."

When Mr. Perkins appeared, the Judge looked sternly at him, and said, "What do you mean, sir, by sending money when you are summoned to sit on this jury?"

Mr. Perkins replied, "I meant no disrespect to the court, your honor, but I was extremely busy fitting out a ship for the East Indies, and I thought if I paid my fine I might be excused."

"Fitting out a ship for the East Indies, sir?" shouted the Judge, "and how happens it you are able to fit out a ship for the East Indies?"

"Your honor, I do not understand you."

"I repeat, then, my question, 'How is it that you are able to fit out a ship for the East Indies?' If you do not know I will tell you. It is because the laws of your country are properly administered. If they were not you would have no ships. Take your seat, sir, with the jury."

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The Fire Hazard of the Flour Mill of the Present Day.

BY. H. H. HOBBS.

The subject of "Flouring Mills" is, according to the programme of the Eleventh Annual Meeting of the Northwestern Association, assigned to me to write upon; and if it were my intention to take for a text this one great topic and view it through all its different phases and aspects, you would naturally expect and demand a collection of data, statistics and facts sufficiently voluminous and expansive in their scope to treat upon the subject in a properly clear and comprehensive manner. And to those of you who are seated here with the expectation of hearing such an essay, I can do no better than refer you to the paper read before our last meeting by our talented associate, Mr. W. B. Cornell, who has done all that could be done in that line. Does it not appear upon first thought, that, in a profession like ours, where a full knowledge and intelligent comprehension of the detail of working and the minutia of construction of so many, in fact of all branches of business and manufacture are pre-requisite to success, that so much time and thought have already been devoted to this one especial subject, and yet upon reflection of the fact of the magnitude of the flouring mill interests, the capital involved in it, and the relation the production of the staple bears to the existence of mankind, can we study it too thoroughly? My aim in presenting these pages for your perusal and criticism, is, as I said before, not to theorize upon the subject in a general way, but simply to briefly review the physical and moral hazard (as underwriters express themselves) of the flour mill of the present day, and more particularly to touch upon the different new processes and methods now employed in the manufacture of flour.

Much clear and comprehensive knowledge is frequently obtained by comparison, and there comes to mind a comparison which is apropos to this subject. Near the entrance to the grand display of the Millers' National Convention and Exposition, which was held in the city of Cincinnati in June last, was constructed a truthful and vivid representation of the exterior of the grist mill of our forefathers. Art had successfully studied to copy nature, and and from down an admirably constructed hillside came a stream of natural water, which was conveyed to an old fashioned "bucket" wheel by means of a moss-covered wooden trough; the wheel revolving slowly upon a hickory "shaft" communicated the "power" thus deprived to the interior of a bark covered log mill, which was, in all its appointments, as primitive as its surroundings. Compare the mill thus pictured with the model mill of the present day, and do we not learn with emphatic certainty that we live in an age of progress? And further, that if the subjects upon which we were called upon to pass, can in themselves undergo so radical and thorough a change within the time allotted to our stay below, we, in order to keep up with the changes that are so constantly and rapidly taking place about us, must needs be diligent in our studies and inquiries, and keenly alive to the necessity thereof.

The old, low grinding system of flour making needs no explanation and demands no time at my hands; it is thoroughly familiar to you all, and is now nearly obsolete and found only in frontier, or in some localities, custom grist mills. I do not recall a single exception where in any merchant mill in this section of the country, the newer process is not in use.

The advance step toward the production of higher grade flour, as well as the improvement and economy in producing the same, was made in the introduction of the method known as the "New Process," and the product of this process is called "Patent Flour." With this innovation we were made acquainted with the operation, the distinctive aim of which was to produce as large a yield of high-grade flour as possible out of a given amount of wheat. This is accomplished by the use of extra precautions in cleaning, smutting and brushing, followed by frequent bolting and separating, and in some mills by heating the wheat before grinding, it being claimed that heating the wheat immediately before grinding gives a beneficial result in several particulars. First and most important, that the same grade of flour can be uniformly produced at all seasons, as the wheat is all ground at the same temperature. Second, that by heating, the moisture of the berry is drawn to the outside covering or bran, thereby producing the doubly favorable result of drying the berry and toughening the bran. Third, the quality of the middlings is improved, they being coarser, sharper, and purify with much less waste. The heaters, where properly constructed, cannot be considered as a perceptible increase to the fire hazard of a mill, as steam is always used as the agent, and the product must be heated as used and be done in close proximity to the burr, and consequently where constant attendance and observation will avert accident. The middlings purifier has been considered as much of an object of interest and investigation and as great a source of danger as our first teachings in flour mill inspection taught us to regard the smutter. But where the careless or thoughtless introduction of an open light into either smutter or purifier has occurred, the consequence has been a perfectly natural, but disastrous one. The Minneapolis disaster, as you all know, was attributed to fire communicating with fine dust emanating from the purifiers and other machinery of a like character. But carelessness and ignorance can be charged with being elements of human life and character against which we, in our profession, are being constantly brought in contact, and that the introduction of such machinery by which the liability of accident or loss to our companies is enhanced either by carelessness or ignorance or otherwise, is unquestionably an increase of the physical hazard and one which should be fully considered by us, and paid for by the insurer, is not a debatable question. In May, 1878, Minneapolis taught us all that this logic was legitimate, and when other mishaps of smaller magnitude followed Minneapolis as some had preceded it, there were among our numbers many who would frankly admit that we neither comprehended nor contemplated the causes which were producing such dire results, and further, that the mill owners themselves could not be conversant with the dangers of their own mills, or most certainly they would have taken steps to avert the dreadful loss of life and property, occasioned as we believe and argue by their lack of knowledge and experience in the manipulation of their calling. The memorial stone over the door of the entrance to the present Washburn mill, on the falls of Minneapolis, is a constant and lasting reminder and witness of the truth of this assertion. It is, however, fair to presume that the knowledge and benefits purchased at such a cost have tended to guard against a recurrence of a like character, and in all well regulated mills the introduction of preventives in the shape of inclosed stationary lamps, Davy safety lamps, inclosed air-tight dust rooms, patent ventilators, dust-cloths, etc., have to a great degree modified the danger.

We now come to the last process employed in the manufacture of flour up to the present day. It is called the Hungarian or roller process, and from present indications, judging from the number of mills which have already, or are to adopt it, it may be regarded as the process which is to be employed by the leading merchant mills of the country. The leading features of the true Hungarian roller system are—(I quote a millwright of prominence and undoubted authority, and one who is qualified to judge by experience among mills of this character in Europe, where the process has been in use for years, who writes as follows):

1. A thorough and systematic cleaning of the wheat with the most improved scouring and brushing machines and separators for the elimination of extraneous seeds and dust.

2. The granulation is done entirely by grooved chilled iron rolls having from eight to thirty grooves to the inch, the reduction leaving the bran finished.

3. The separation of the light chaff from the breaks by means of aspirators.

4. A thorough and systematic grading and purifying of the middlings by means of air or sieve purifiers.

5. The sizing of the middlings on smooth chilled iron rolls having equal speed in order to reduce them in size and eliminate the germs and bran specks which may adhere to them.

6. The final reduction to flour of the fine, clean middlings, by means of porcelain rolls having different speeds.

7. A full and complete separation by bolting following each of the above operations.

This gentleman goes on to state that "by this system about twenty-five per cent more flour can be made by the same power, the yield is increased about twenty pounds to the barrel, and the flour is all of a higher grade, with a much larger percentage of choice flour and very little low grade." If we assume these facts to be as stated, have we not indeed a revolution in this line of manufacture? Less power produces, with a given amount of wheat, better flour, and more flour, by the Hungarian process, than if made by any other known process. Let us see further. The process described above as the true Hungarian process is claimed to be bettered by some of our enterprising millers, by reducing or crushing the wheat through three, four or five pairs of rollers, separating and bolting after each, with aspirator used in connection with each roller machine, and then passing the product thus partially reduced, between a pair of finely cut burrs. One mill in particular that has come under the writer's observation, uses in the final process a cast iron wheal delicately and finely sharpened on the flat side running in connection with a French burr, which they claim is doing excellent work. Whether or not these departures from the "true" system will prove advantageous time, experience and constant experimenting will alone decide. It will, however, be out of the usual order if Yankee brains and ingenuity do not improve upon the methods of the Old World. Tersely expressed, the difference between a new process patent flour mill and the Hungarian or roller process consists simply in the difference in the respective methods of reducing the grain—in the new process mill the work being done by burrs—in the Hungarian the wheat is crushed not ground, and is done gradually, by grooved iron and porcelain rollers with a constantly recurring and consequently more thorough separating, bolting and purifying. As to the advantages and disadvantages, pro and con, as between the two methods, as viewed from an insurance standpoint, let us look first upon that which we term the physical hazard.

1. As to the danger from friction or fire from sparks created by either the stones running dry or the introduction into the feed of any foreign or metallic substance, my judgment in this particular is decidedly in favor of the roller system, and this decision is coincided in by all insurance men and millwrights, who have examined into the matter. A stone or a nail to pass between metal rollers would throw either the upper or lower roller out of true, as the rollers are delicately adjusted, and are so set that they can be spread apart at once. A like substance passing between porcelain rollers would break them, and, it is believed, do no further damage.

2. As to the cleanliness of the same capacity mill of the two systems—again the verdict will be in favor of the roller mill, except wherein the process of purifying and bolting is increased in the roller mill and proper construction and ventilation of these machines is not observed. The roller machines themselves are comparatively dustless, as the separating and bolting process between each break removes the particles which create the dust.

3. It is a noticeable fact that in a majority of the mills recently reconstructed into roller mills, as well as of the entirely new mills erected, that the cleaning machinery is being removed from the mill proper. This is probably explained by the fact that the roller mills require more room for purifying and bolting. And on one hand while the hazard of extra purifiers and bolting chests and reels is added, the hazard of the smutter, the brush and the separator is avoided.

4. Upon the point of lubrication I can find no change (neither an improvement nor a retrogradation). Properly conducted mills where the management is competent will never use anything but highly refined lubricating or lard oil upon the many rapidly running journals of their different machines, and to my mind, when this care and judgment is not apparent, or where we find crude or partially refined, cheap oil, or heavy earth oils, used as a lubricuting medium, or where heating of the journals can be observed to any degree, the natural effect of too infrequent lubrication, prompt measures should be taken to remedy this evil (which cannot be exaggerated) or to take up the policy.

"The moral hazard of the flouring mill of the present day." An old familiar adage tells us that "Straws show which way the wind blows," and I firmly believe that from the number of prominent merchant mills in the West and Northwest which have adopted the roller machinery, we may cease to look upon them in the sense of an experiment, and accept without hesitation the fact that this system will eventually be universally adopted. One writer on this subject says: "It is our judgment, from a careful and thorough investigation of the system as practiced in Europe, and the experience we have had in this country, that rolls are the only machines by which reductions can be properly made. Those millers who have tried rolls, or, better still, have tried to compete against them, will agree with us." This is plainly and concisely stated, and to us speaks volumes.

There is no doubt but that a general feeling is growing among companies writing upon flouring mills, that while the roller process will, in expense of running and quality of goods made, give a decided advantage to the larger mills, smaller mills, not able by reason of limited area or capital to improve their machinery, will be at a disadvantage, and consequently fear there will be among them (the smaller mills) a large increase of moral hazard. Whether or not this feeling is based upon sound logic, it behooves us as the representatives of our companies, to use our best efforts to solve the question, and in considering the subject, we cannot but conclude that the operator of a merchant mill, who is not sufficiently alive to the necessity of improvement and advancement in his business, to adopt whatever may be deemed advantageous to his business, in order to successfully meet the natural competition in his line of trade, cares so little for his business and his mill, that we as underwriters should be chary in placing our policies between him and loss.

A conversation held between a special agent, well known to all of you, and an eminent millwright of Minneapolis, is reported to the writer to have brought forth the following statements, which are given for your reflection: It was argued by the millwright that the roller process was a success, that it had ceased to be regarded as an experiment. The mills which were of the largest capacity, whose brands were most sought for upon the seaboard for export, were all either then using the "crushing" process, or were to use it. That it would, in this gentleman's opinion, be an unprofitable effort for any mill to try to compete against the roller process when engaging in manufacturing flour for merchant or export markets; and, lastly, that within five years' time all then existing mills of the character above referred to would be using the true roller process, either as described to you in this paper, or improved upon. If your judgment and experience lead you to agree in this opinion and comment (and would it not be wise to come to a conclusion based upon your judgment before your experience proves it to you), the query naturally arises, what then is to become of the mills which are not in proper competing shape? I leave that question for each of you to answer for himself.

The single fact that a certain mill has not seen fit to equip itself with roller machines, however, ought not to be enough to condemn it as a subject for insurance. There are other features to be regarded when considering the "moral" of a flouring mill, which each in itself is as important as the one upon which we have just written. This point of consideration is one upon which it is useless to theorize; practice, consistent, but well defined, a principle thoroughly understood and always lived up to; and inspection, unvarying and imperative, are essential to determine whether the moral is free from taint. If you will be successful in anything you undertake, you must be practical in it. It will do to listen to theories, but carry out your own convictions. If you see a risk, be it flouring mill or what, which your judgment cannot approve, cancel it. Do not get into the pernicious habit of instructing the agent to drop it at expiration. You will not only do your company the proper service you owe it, but will gain the respect of your agent by his knowledge of your sincerity of purpose, and firmness to do what you believe to be your duty.

Where, then, shall we look for a moral taint in a flouring mill of the present day? Crowded, old fashioned, old machinery mills, heavily encumbered, and having more interest to pay than profits to divide. Mills having no practical, interested head, where a dishonest employe may commit the crime of incendiarism to shield the crime of embezzlement. Ask yourselves the following questions, after your thorough inspection of the mill, and be governed in your decision by the answers the facts and circumstances will give you. Is the mill properly situated? That is, can it supply itself with wheat at prices which will admit of its competing with other mills in its market, and are the facilities for selling and shipping such as they should be, to enable the mill to have a fair margin on its products? Is it a steam power mill? Then, has it water-power competition to such an extent as to enhance its cost of operation, and to make the cost of its product greater than that of its more favored competitor? Is the mill of such construction that if it has not already put in the newer and approved machinery it could easily do so? Bearing in mind that a much larger area is required to fully equip with a roller process machinery than the old process, the capacity of the hypothetical mills being equal, those points well and clearly defined and understood, will give a good insight into what might be termed the apparent visible moral hazard. But there is another phase of moral hazard which requires keen insight and close perception, if not intuition to discover. I

refer to the man as an individual, which we are called upon to insure, and these remarks apply to every class of hazard, with a more particular reference to that class which we designate as "specials." In many cases the greater risk is in the man, not in the premises. To investigate the habits of people, and to keep watch over them as a preventive against fires, is a material duty.

Conflagrations are classed as the result of accident, of spontaneous ignition, or of design. Now, where is the line to be drawn between, say, spontaneous ignition or design? Spontaneous ignition can be prepared as easily as cotton can be dipped in oil. Greasy rags can be swept into hot corners, or under dark stairways, apparently without thought, and a fire is as sure to result as if a match were applied. The smutter, the purifier and the separator, when operated with care and intelligence, are comparatively the cause of but little danger; but the journals can be allowed to heat, the dust to accumulate, or the dripping from the boxes to saturate the floor, accidentally, and in such a manner that destruction by fire is merely a matter of time. The majority of fires come from unknown causes. Seek out these causes and prepare to check them before they develop into destruction. Aim to keep them down, and you will insure a good result. It is not a fact that the greatest proportion of fires are in insured premises, while the uninsured are, as a rule, of a more risky class, and more poorly built?

In attempting to write upon the moral hazard of a flouring mill of the present day, I feel myself sadly at a loss to express the ideas and convictions which are upon me, and without intending to cast any reflection upon the honesty of purpose of those millers who have pronounced against the introduction of the innovation of the day in their line of trade, are we not forced to the belief that the opinion and and decision of the majority of the merchant millers, who have given the roller system practical and fair trial, is of as much weight in our minds, as the verdict of those on the other hand who have been forced to compete against it? I had not intended to touch upon the question of rates, but am, in summing up what I have here written, led to say that it is but fair to admit that in any line of trade we should consider the efforts made and the money spent in the improvement of the fire hazard. But from the fact universally admitted, that mills everywhere and of every kind have, during the past ten years, been written at a loss, by a majority of the companies writing them, must we not conclude that rates in these hazards should be regulated upon the true basis of schedule rating, wherein a modern improved mill would be fully credited, and derive the benefit of all it had, while the opposite class of mills would be charged for what they had not?

Can any one define or describe that peculiar intuition which often compels us to decide adversely upon a submitted risk, really before we have given the survey the close study and careful observation we should? To accept a line on a mill, or any risk, with a secret wish that it had been declined, subsequently proves in many cases that it would have been wiser to have refused it. Give your company the full benefit of the experience you have had, and the knowledge you have gained, and be guided by your candid judgment, taking upon the company's side the benefit of all doubts. Not in order to oblige or accommodate an agent (a most pernicious habit, which the strife and competition for business and premiums has led many into) involve your company in a loss, and bring deserved discredit upon yourselves.

In closing: The subject is a broad and expansive one, and one which each day's work and observation will bring fresh information and a clearer insight into. May our efforts to an honorable and full protection of this great industry be only measurable when compared with the profit realized by our companies in so endeavoring.

The Chemistry of Bread Making.

BY PROFESSOR GRAHAM, D. SC.

LECTURE V.—CONCLUDED.

Our bread being made, the next point one has to consider is, How is it digested? Now, digestion is a continuance of fermentation. Of course, I am using the expression fermentation in the same sense that I used it in speaking of the hydration action upon starch. I am not using the term now in the sense of the boiling fermentation, where carbonic acid and alcohol are produced, but that form in which water is added to the molecular structure of the starch, and by which sugars and dextrin are formed. The first agent which is brought to bear upon the bread is the albuminoid ferment called by physiologists, *ptyaline*, which is found in the saliva. In order to obtain a thorough and rapid hydration of the starch, so that starch is converted into soluble bodies, sugars and dextrin, it is necessary that the bread should be thoroughly comminuted, and we are endowed with a very wonderful apparatus for the purpose of cutting and grinding it up into a fine, porous mass. At the same time, while this operation is going on, the grinding action stimulates the glands, so that during the time they pour out the secretion destined by Nature for the solution of these starchy bodies. Of course, two points have here to be considered. I said we must obtain a fine, light, porous mass, and we must, therefore, so cut up or grind that bread that it should always remain a fine porous mass; that it should be thoroughly aerated, and at same time well mixed with this albuminoid ferment of the saliva. Manifestly, therefore, we see at once that the habit, which is so common in England, of eating hot rolls and new bread, is the very opposite of what Nature has pointed out should be done. Bread which, when you press it between your finger and thumb forms into impervious balls, is not a bread which lends itself readily to the action I am speaking of; and I have been told on good authority that bakers who have found out for themselves so many very interesting scientific facts connected with the whole process of panification, seldom eat new bread. Indeed, one gentleman said they never did; they wait, at any rate, until the second day, until it will, in the grinding action, remain light and porous for the action of the *ptyaline* upon it.

Mr. Lewis has kindly heated two tubes. In my right hand I hold a tube which contains a solution of bread, made simply by breaking it up to a fine powder, and then digesting it for two hours at a temperature of 100 deg. Fahr. It was then filtered; nothing but water was added to the bread, and he has added some of Fehling's liquid and has boiled it. You see that there has been no reduction, or, at any rate, a very small reduction of the protoxide of copper to the suboxide. Whereas, in the other tube the bread was comminuted into the fine condition in which it should be, as was also done in the other case, and it was then mixed with a little saliva obtained by exciting the sub-maxillary gland. This was warmed also at about 90 to 100 deg. Fahr., for about two hours, and you see the amount of sugar that has been formed. Where the saliva has been mixed with the bread, it has produced a considerable quantity of sugar. So far for the sugar. On the addition of a little alcohol, we shall be able also to see a considerable difference in the total amount of products which have been rendered soluble under the two conditions. The right hand tube was the one submitted to the action of the saliva, and the left hand one exhibits simply the action of water on the bread. There is in the one case a considerable precipitate, and in the other very much less. I will also show you the amount of albuminoids which have been rendered soluble in the same time. While Mr. Lewis is doing that, I will make a few remarks on the necessity for all of us to husband this valuable fluid. It is not given us to throw away, and those of you who are just about to begin manhood's life, I should certainly recommend, if possible, not to adopt the habit of smoking. But still, if you should smoke—and I do not suppose anything I may say will prevent you—I should recommend you to learn the way in which a German smokes. Any average German will smoke from morning to night, from the beginning of the year till the end, and will not expectorate once; he learns the habit of smoking without expectorating, and the result is he is none the worse for his smoking—at least, one does not see it; whereas we in England, with our short pipes, smoke tobacco loaded with moisure—which is one of those delusions about pipe tobacco which has arisen, probably, from the interest of tobacconists. You know most people have the tobacco loaded with moisture, and keep it in a jar with a leaden cover to it. Thus considerable quantities of unburnt nicotine distil over the moisture, and also, at the same time, tarry products and creosote; whereas, when the tobacco is dry, a comparatively small quantity of these distil over into the mouth, and, therefore, there is no necessity to expectorate. In these tubes you have, on the left hand side, the solution which has been acted upon by some ferro-cyanide of potassium and acetic acid, and that has thrown down most of the albuminoid matters. The one on the left hand side is the solution of bread simply with water, the other on the right hand, of course, has had saliva added to it. In the left tube you see there is no precipitate, or an excessively small quantity of albuminoid matters; whereas, in the right hand tube—due to the saliva—we have an abundant precipitate of albuminous matter. We see, therefore, that this valuable fermenting principle which we have at the very threshold of digestion, is able to convert boiled starch into sugar and dextrin with considerable rapidity, and at the same time also it breaks down, and therefore dissolves some of the albuminoids. It then passes downward, and in the stomach and duodenum it meets with other fluids, some of which have the power also of hydrating and converting starch into sugar and dextrin, and some others have the power of dissolving the albuminoids themselves. In that way we obtain the perfect solution of the bread that we eat.

I pass on now to a very interesting matter, and that is the value of bread as food, or its value as a source of power. I have here a table which we owe to the researches of Messrs. Lawes and Gilbert, showing the composition of the ordinary articles of food—meat, bacon, butter, milk, cheese, flour, bread, maize, oatmeal, rice, potatoes, vegetables, peas, and sugar.

AVERAGE COMPOSITION OF ARTICLES OF FOOD. (LAWES & GILBERT)—PARTS PER 100.

	Dry Substance.	Carbon.	Nitrogen.	Nitrogen to 100 Carbon.
Meat	45	30	2.0	6.6
Bacon	80	57	1.0	2.0
Butter	85	68	....	....
Milk	10	5.4	0.5	9.3
Cheese	60	36	4.5	12.5
Flour	85	38	1.7	4.5
Bread	64	28.5	1.3	4.5
Maize	87	40	1.7	4.4
Oatmeal	85	40	2.0	5.0
Rice	87	39	1.0	2.5
Potatoes	25	11	0.3	3.5
Vegetables	15	6	0.2	3.3
Peas	85	39	3.6	9.4
Sugar	95	40	....	....

I will not, of course, detain you by reading all these numbers, but I wish to point out to you some very interesting results obtained from a consideration of these researches. We find in the fourth column a series of numbers headed, "Ratio of nitrogen to one hundred parts of carbon." In the case of wheat, it is 6.6; bacon, 2; of course in butter none; milk, 9.3; cheese, 12½; flour, 4½; of course, bread is the same; rice, 2½; ordinary vegetables, 3.3; and so on. In sugar there is no "nitrogen." In looking at this table, you will see that flour and bread stand tolerably high in the ratio of nitrogen to carbon, viz., 4½ to the 100. This leads me back again to a matter I spoke of before, viz., the question of what one should do with the bran of the wheat. Supposing a hard-working laborer, say a ditcher or a navvy, were supplied with white bread almost in sufficiency, but yet not quite, what would he crave for? We all know, as a matter of fact and experience, and those of you who have seen men undergoing hard mechanical work, will agree with me, his first craving is not for a lump of brown bread, but for a piece of fat, butter, or bacon; but in any case the craving is not for more nitrogen, but for more carbon, and especially if that carbon be derived, not from the carbo-hydrates in which, as I pointed out to you, the hydrogen and oxygen are in the ratio in which they form water, but bodies such as fat, in which there is a very small proportion of oxygen, and, therefore, a considerable excess of hydrogen; in other words, bodies which contain, not merely respirable carbon, but also respirable hydrogen, that is, hydrogen over and above that which is required to form water with the oxygen in the compound. That is what a man craves for. If the laborer were to select cheese instead of fat, even then, in cheese, there is a considerable quantity of fat, and from the fat of the cheese he would obtain a considerable amount of heat force, vastly more than he would from the caseine of the cheese. But, probably, what the great mass of working men undergoing hard work would desire most to have, would be very fat meat. Those of you who may have seen navvies consuming large quantities of excessively fat bacon, so fat that one can see no lean in it, will readily understand what I am pointing out. And yet there is a very current notion that it is the lean of the meat that gives us the greatest amount of motive force—the greatest amount of mechanical power; whereas, not only will a laborer in our own country, but the Chinese coolie who lives upon rice, when he has to do a large amount of work, such as loading a ship (and it is astonishing the enormous quantity of work they can do under pressure), does not look to albuminoids in order to give him that extra power; on the contrary, he uses butter or fat with his rice. He uses those fatty compounds that contain carbon, and contain what chemists would call potential force in the hydrogen, over and above what is required to form water with the oxygen in the compound.

Let us see if science cannot explain this difference of opinion. We have the instinctive craving of the laboring classes throughout the world; and we have certain views, which have been accepted, that lean meat, or albuminoids, are the best sources of motive power. Before coming to the table, which I have here, on the mechanical equivalent of food, I think it will be convenient if I explain to you a few numbers that are necessary to be understood before we can consider these sources of power. According to the definition used by physicists, we say that a unit of heat is the amount of heat required to raise a gramme (=15,432 grains) of water 1° Cent.

If you take one gramme of pure carbon—say, the very finest charcoal—and thoroughly burn it to carbonic acid gas, the amount of heat given out by that oxidation of one gramme of carbon would be sufficient to raise 8,080 grammes of water 1° Cent. I must apologize for using French weights and measures, but I am very much more conversant with these data in the French than in the English weights and measures; but I will afterwards put the statements in a plainer form, so that you will be better able to follow me. Now, hydrogen gives out rather more than four times as much heat as carbon. One gramme will give out as much heat, when converted into water by burning, as to raise 34,462 grammes of water 1° Cent; that is, merely considering the amount of heat force obtained from the oxidation of carbon and hydrogen, and looking at it solely from the point of view of how much water that oxidation will warm. In order to convert this into the mechanical motion of lifting a weight against gravity, all we have to do is to make use of the data obtained by the most invaluable researches of Dr. Joule, of Manchester, published some years ago, by which he determined what is the mechanical equivalent of heat. He found, when a gramme weight was allowed to fall through 424 metres, the force thus generated being made—by proper mechanical contrivance—to agitate water, that an amount of heat was produced equal to raising the temperature of the same weight of water—that is, one gramme—1° Cent. The force obtained from a falling weight can be converted into heat-force, and, conversely, the heat of combustion can be converted into raising a weight against gravity. Thus, a gramme of carbon, when burnt to carbonic acid gas, produces 8,080 units of heat, and is, therefore, equivalent to 8,080x424=3,319 metre kilogrammes of work, or rather more than the force produced by three tons falling through one metre. The same weight of hydrogen, when burnt, produces more than four times as much force as carbon, and is equivalent to 14½ tons falling through one metre.

Now, these data being explained, I will proceed to consider the motive force obtained from the various sources of food we make use of, and, thanks to the researches of Voit, Pettenkoffer, Bischoff, and others abroad, and Playfair, Edward Smith, Frankland and others in our own country, this matter has been made very clear. In the experiments of Frankland, by which he determined, by very well-known methods, the heat of combustion, not merely of carbon and hydrogen—that had been done before—but the heat of combustion of lean meat—that is to say, meat deprived of fat by digestion in ether—fat meat, rice, potatoes, starch, and so on, be found that the heat of combustion of fat was rather more than six times that obtained from the same weight of

MECHANICAL EQUIVALENT OF FOOD. (IN NATURAL STATE AS CONSUMED.)

Weight of Substance One Gramme (=15.432 Grains).	Complete Oxidation. Units of Heat.	Complete Oxidation. Meter Kilogrammes of Forces.	As burnt in body. Meter kilogrammes of Forces.
Potatoes	1.013	429	422
Flour	3.936	1669	1627
Oatmeal	4.000	1696	1665
Rice	2.813	1615	1591
Lean of beef	1.567	664	604
Beef fat	9.969	3841	3841
Cheshire cheese	4.647	1969	1846

lean. I am not using the word "lean" in the sense that you and I do where we speak of a lean beefsteak as having no fat in it—a lean beefsteak contains a good deal of fat—but the lean mean deprived of fat by proper chemical means. He found that fat can develop more than six times as much heat as the same weight of lean. Now, Dr. Frankland, in carrying out these researches, determined not merely the absolute amount of heat-force obtained, but the amount of force obtained by carbo-hydrates, from fat, and from albuminoid matters, when used by man. Albuminoids are not burnt up to carbonic acid and ammonia; they are eliminated chiefly as urea, slightly as uric acid and, in birds and reptiles particularly, a considerable quantity is eliminated in the less oxidized form of uric acid. By making a deduction from these determinations of the eliminated urea, the result of his researches was, that the fats yielded a very large amount of force compared with the albuminoids—as I said before, about six times as much. Two German chemists—Messrs. Fick and Wislecenus—experimented upon this matter. They carefully and most accurately weighed everthing they ate, and accurately determined the excrete products, the carbonic acid, and so on. They found that, in going up the Faulhorn, which is 10,000 feet high, they burnt 37 grammes of their muscles. Now, according to the researches of Frankland, this 37 grammes of muscle was only equivalent to 68,000 metre kilogrammes of force; whereas, the total amount of force expended in going up a mountain of that height was 319,000 metre kilogrammes—leaving a deficiency, therefore, of 251,000 metre kilogrammes. This was entirely due to the fat and the carbo-hydrates they consumed, and not due to the oxidation of their own muscles. From the researches of these gentlemen, and those of Playfair, upon laborers, and of Haughton, who experimented upon soldiers undergoing shot drill, and Dr. Edward Smith, who experimented not only upon individuals undergoing the treadmill, but who also worked the treadmill himself, and also from the work of Dr. Frankland, we now know that the heat of combustion we obtain, and the amount of force we generate, is due chiefly, not to the nitrogenous, but to the non-nitrogenous parts of our food.

This is not all. As the work done increases in severity, it is not the nitrogenous compound urea that increases, but it is the carbonic acid gas which increases in the eliminated products of combustion. The greater amount of work done in a given unit of time, the greater is the amount of carbonic acid produced. Dr. Smith, in experimenting upon himself, found that, when he was sleeping, he eliminated 19 grammes of carbonic acid gas per hour from his lungs. It was carefully quantified and weighed. When sitting, 29 grammes were eliminated; when walking two miles an hour, 70 grammes, three miles an hour, 100 grammes; when ascending the treadmill, at the rate of 28½ feet per second, it amounted to 190 grammes per hour. Then, you may say, granting that the carbonic acid increases the more work is done, whereas the urea increases but little, what function does the muscle perform in the system? The function that the muscle performs is precisely the same as the piston-rod, together with the machinery, play in the ordinary locomotive. You know that the function of the piston-rod of a locomotive is to convert the heat from the oxidation of the coke or coal—which, of course, operates in changing water into steam—into a motion of the mass; so that, in that way, by burning fuel, you can drive a train at 50 or 60 miles an hour. Precisely similar is the function of the muscle in the human system; it is the apparatus by which the heat produced from the oxidation of the carbo-hydrates and of the fat is converted into mechanical motion—into the motion, not merely of the pulsation of the heart and other internal mechanical work, but the motion of the body in walking, or running, or climbing hills, and other mechanical work. There is this difference, however, between the muscle and the piston-rod; not merely the piston-rod, but all the parts of the engine are carefully constructed by the engineer, so as to avoid what is technically termed "hot bearings;" in other words, there must be no local production of heat by friction in any part of the engine. There is this difference, then, that the muscle is partly oxidized and broken up, but the amount of heat obtained from the oxidation of the muscle is only converted into mechanical motion in about the ratio of one-third of the total heat produced, two-thirds going to heat the body, and only one-third going to produce mechanical motion. We are indebted for these researches to Heidenhelm and others.

To take a more practical view of this question, one that will be more readily understood by most of you, I will take some of Dr. Frankland's results upon the heat of com-

bustion produced by oxidizing various articles of food. Supposing we were to take the average of all persons present in this room, and assume we are all ten stone weight (140 lbs.), and if we wished to go up 10,000 feet against gravity, what amount of force should we require? I could have given you the quantity in metre kilogrammes of force, as I have already done, but let us see what amount of money it would cost in the form of different kinds of food, in order to do that amount of mechanical work.

WEIGHT AND COST OF FOOD REQUIRED TO RAISE 140 LBS. 10,000 FEET HIGH.

	Weight in lbs required.	Cost per lb. in pence.	Total cost in pence.
Potatoes	5	1	5
Flour	1⅓	3	4
Bread	2⅓	2	4¾
Oatmeal	1¼	2¾	3¾
Rice	1⅓	4	5½
Lean of Beef	3½	12	42
Beef Fat	½	10	5
Cheshire Cheese	1 1-5	10	12

On this table we have the number of lbs. required of different kinds of ordinary food to produce this amount of mechanical work. If we take potatoes, we find 5 lbs. of potatoes would be required, and if we consider them as costing 1d per lb. it will cost 5d. You will readily understood that the last column, which gives the value of the articles, will vary from time to time. Of flour we should only require 1⅓ lb., which is taken at about 3d per lb., and this would therefore only cost 4d. Bread would cost 4¾d; the difference is due, doubtless, to the expense of the process of making bread. In the case of lean beef, deprived of fat, 3½ lbs. are required; and, as the cost of very lean beef is taken at 1s per lb., that would cost 3s 6d, whereas the fat would only cost 5d, because so small a quantity as ½ lb. would do the work which 3½ lbs. of lean beef would do; 1 1-5th lb. of Cheshire cheese would be required, which, assuming the price to be 10d per lb., would cost 1s, to do that amount of mechanical work. Of course, this table is merely suggestive, but you see perfectly well that man does not require a large quantity of albuminoids in doing heavy work.

I told you that bread contains a very fair ration of nitrogen to carbon, and that, when considered from another point of view—the mechanical work capable of being done by the use of such food materials—that, really, the money spent upon flour is not at all badly laid out; whereas, on the other hand, if you wish to have a large quantity of work done in a short time, then, in addition to bread, we require not to use much nitrogenous matter, but rather to use fat, and, therefore, the peasants, not merely of England, but of all countries have been right, in spite of many scientific assertions that they were wrong, in their instinctive habit of adding fat, rather than nitrogenous food, to their diet when undergoing hard work.

At a former meeting I said I would again revert to the subject of bran; in doing so now, I wish to be distinctly understood that, in my criticism against the admixture of bran with flour, I have been anxious to defend the miller from the charges of being ignorant of true scientific principles. I hold that the miller who so well mills his flour as to eliminate all bran is the man who is working on true scientific principles. His object is to enable the baker to produce a fine, well-piled loaf, not a sodden, heavy one. I think it is right I should suggest a method by which wheaten flour may be used, and yet not produce the injurious effects which I told you finely-ground bran, with its cerealin, produces in the panification process. This is to do what I suggested at the last meeting should be done with inferior flours, namely, to make the ferment and the sponge of really good, strong flour, and then in the dough process, when it is so much stiffer, and where the whole operation only lasts one hour, to use the wheaten flour. Of course, you are perfectly well aware that hydrochloric acid and bicarbonate of soda are sometimes used for raising wheaten bread, but I am suggesting this other plan for those who prefer a fermented loaf, and yet wish to avoid the high-colored products, and sodden bread, formed by the action of the finely-ground bran on this flour during the many hours of the ferment and sponge stages, and who desire that the fermented loaf of whole meal shall be light and porous.

I have, at last, come to the conclusion, and I will briefly recapitulate what, it seems to me, have been the prominent features of our study together. In the first place, you will remember, we studied in some detail the properties of the different constituents of the cereals, giving, of course, more especial weight to wheat. Secondly, we fouud that climatic conditions have a most important bearing upon the nature of those constituents; and then, thirdly we consider together the right mode of treating such weights by the miller, and, subsequently by the baker. Lastly, we saw the necessity of microscopic examinations of the yeast, in order to be sure that we were not introducing into our fermenting process organisms of disease producing acetic acid, lactic acid, butyric acid, and other injurious products. These, perhaps, have been the chief points, though, at the same time, there have been several others which have occupied our attention for some time.

I have now only to say that, if I have succeeded in awakening an interest in the wonderful phenomena connected with the art of bread-making, and have raised in our minds a true conception of the high importance and dignity of the art—based, as we have seen it to be, on some of most interesting departments of physical, chemical and biological science—and if I have stimulated any of you to resolve on the further study of these sciences, whereby greater and more rapid progress may be made, I shall rejoice that my efforts have not altogether failed.

NEWS.

EVERYBODY READS THIS.

ITEMS GATHERED FROM CORRESPONDENTS, TELEGRAMS AND EXCHANGES.

Montrose, D. T., wants a flour mill.

R. West is building a mill at Burnsville, Ky.

A two-run mill is being built at the Yellowstone Agency, Dakota.

A new mill is being built at Oakford, Ind., by Joseph Haskett.

The Spearfish, D. T., mill has a capacity of 500 barrels per day.

It is said that President Hayes will sail for Europe in May next.

W. Forkel has become owner of the Diamond Mills, Farmington, Iowa.

A firm in Hamburg, Germany, manufactures porcelain millstones.

Dickson and Amsden have just purchased the mill at Storm Lake, Ia.

Eighty millwrights are at work on the Queen Bee Mill at Sioux Falls, D. T.

The Humboldt Mill, at Minneapolis, it is now said, will be entirely remodeled.

A new four-run steam mill is to be built at Lafayette, Ala., by Mr. J. Y. Trammel.

Eichler & Son have purchased a 4-run new process mill at Orange, Juneau Co., Wis.

Jacob Rohm, of Mansfield, Ind., is building a two-run water mill, to have two turbines.

Cold weather has stopped the mason work on the new Archibald mill at Dundas, Minn.

The official report says that Ohio produced 54,522,794 bushels of wheat in the year 1880.

150.000 barrels of flour were received in Chicago during the week ending November 16.

The yield of wheat in Great Britain and Ireland this year amounted to 84,000,000 bushels.

J. C. Neal, of Sullivan, Ind., has just received an order from Europe for 1,000 barrels of flour.

Kafader & Fisher, of Worthington, Ind., are putting in a large amount of new machinery.

W. A. Schofield's mill, situated five miles north of Indianapolis, Ind., is being remodeled and enlarged.

The Minneapolis millers, having filled all their warehouses with wheat, are now storing in St. Paul.

Peter E. Kern, of Pigeon Falls, Trempeleau Co., Wis., is rebuilding his mill recently destroyed by fire.

Daniel Clune's mill, in Holland, Brown Co., Wis., burned November 26. Loss, $6,000; insurance, $3,000.

The flouring mill owned by Gardner, Campbell & Co., at Irving, Mich., was destroyed by fire Nov. 23. Loss, $35,000.

The net earnings of the Chicago & Northwestern Railway for the past year over the previous year were $1,424,421.

Mr. W. De la Barre, the consulting engineer of the Washburn Mills, Minneapolis, after a short visit to Europe, has returned.

McIver & Lipscomb's mill at Nashville, Tenn., is being enlarged, and new rolls, purifiers, bolts, etc., are being added.

A hot journal on a middlings purifier caused the burning of Wm. Lampe's mill at Chaska, Minn., Nov. 2. Loss, $2,500; insurance, $1,800.

An explosion took place November 12 in the Ford pit at the Albion mines at Stellarton, Nova Scotia, at which about thirty-five men were killed.

A neat three-run new process water mill is being built at Farwell, Mich., by Geo. L. Hitchcock. This will make two mills now owned by Mr. Hitchcock.

H. H. Williard, a carpenter at work on the scaffolding of the new Pillsbury mill at Minneapolis, Minn, slipped and fell a distance of 90 feet, killing him instantly.

Jones & Chaney are re-modeling the old Jones mill at Bourneville, O. Simpson & Gault have a force of millwrights at work in the mill, and are also furnishing the machinery.

W. S. Hoke, of Parsons, Kan., is building a large grain elevator under the direction of Nordyke & Marmon Co., of Indianapolis, Ind., who also furnish all the machinery for same.

Messrs. R. Gregg & Co., of Cannon Falls, Minn., own two mills at that place, the Goodhue Mills, capacity, 225 barrels, and the Old Mills about 200. Both are driven by water power.

The emigration to the Western States from the Eastern States and the Canadian Provinces is simply enormous. Thousands upon thousands are seeking for homes on the fertile plains of the Great West.

Fred. Knoche, an employe in G. N. Miner's feed mill at Cedar Falls, Ia., got his clothing entangled in some gearing in the upper story, and was crushed to death. November 12 was the date of the sad accident.

The warehouse and contents belonging to H. B. Graff & Co. and others, at Lancaster, Pa., burned Nov. 24. Loss on warehouse, $20,000; insurance, $9,500. Loss on contents, $50,000; insurance, $25,000.

Lawson & Bell, of Gallipolis, O., whose mill was destroyed by fire in October, have contracted with Nordyke & Marmon Co., of Indianapolis, Ind., for a new five-run steam mill having all improvements to date.

Four thousand six hundred and fourteen miles of railroad were constructed in this country during the first ten months of 1880. Two thousand eight hundred and fifty-nine miles were constructed last year.

L. Pauly's mill, at Alma, Kan., has lately undergone extensive alterations, and its capacity increased to fifty barrels per day. The millwright work was done under the superintendency of J. T. C. Willman.

James W. Hamilton, now living at Newton, Jasper County, Iowa, built the first mill at St. Anthony, Minn., in 1854, for Messrs. Rollin, Upton & Eastman. He also thinks he was the first to use belts for driving millstones.

November 9 a desperate attempt was made to murder Mr. R. H. Appleton, a prominent miller of Stockton, Eng., by a former employee. Several shots were fired, but it is believed that none of the three wounds received will prove fatal.

November 19 a boiler exploded in O'Neal's saw and grist mill at Stevenson, Ala., killing four men and seriously injuring four more, and completely demolishing the mill. The explosion was the result of carelessness on the part of the engineer.

The Leon Mill Company, at Little Walnut, Kan., ordered of Nordyke & Marmon Co., of Indianapolis, Ind., the machinery for a new process three-run mill, with engine. (Mr. Tong, the secretary of the company, contracted for the machinery.)

William Schultz, Esq., a well-known miller, of Sigourney, Iowa, was offered inducements to build a three-run new process steam mill at Thornburg, Iowa, and has purchased the necessary machinery from Nordyke & Marmon Co., of Indianapolis, Ind.

A company of French capitalists have a scheme on hand for placing settlers from Alsace and Loraine on 150,000 acres of land in the Northwest. The delegate of the company is in consultation with the Canadian authorities on the subject.

The mills in New England, New York and Pennsylvania are compelled to lie idle much of the time on account of low water. A Maine farmer alleges that the cause of the low water is owing to the *large quantity of ice cut out of the streams last winter.* Next.

A change has been made in the milling firm of White, Listman & Co., of La Crosse, to take effect Dec. 16. Mr. White retires from the firm. Mr. C. L. Colman and G. Van Steenwyck enter as special partners, investing $20,000 each. The firm name will be Wm. Listman & Co.

This year's wheat crop of the big Dalrymple farm in Dakota foots up 432,000 bushels—about 900 car-loads or 45 train-loads of 20 cars per train. This immense crop will go to the seaboard by way of the lakes, through Canada and the Erie canal, and is expected to net 60 cents per bushel at the farm.

November 15 a portion of the insane asylum at St. Peters burned, and, as near as can be ascertained, 32 persons were burned or died subsequently from the exposure to the terrible cold and from nervous prostration caused by fright. Gov. Pillsbury will advance money for the immediate rebuilding of the portion of the building destroyed.

The prominent millers of Bartholomew county, Indiana, have organized an association to be known as the "Courtland Milling Company," and will immediately commence the erection of a six-run new process steam mill and elevator, at Seymour, Ind. They have contracted with Nordyke & Marmon Co., of Indianapolis, Ind., for all the machinery.

There is a great complaint of a scarcity of water in the Eastern portion of Pennsylvania. Not only is there such a scarcity of water that mills and manufactories have to remain idle, but in many places the farmers have to drive their stock miles to water. A light snow has just fallen (Nov. 29) and it is hoped that a thaw will take place which will furnish water soon.

The sawdust of a mill at Victoria harbor is burned in a kiln eighty feet high, made of boiler iron. Carriers, on an endless chain, carry the refuse to a door forty feet from the ground, and dump it into the fire within. The other day an employe named Payne, who looks after the carriers, got on one of them to go to his place at the door above. Everything went all right until he got close to the doors, when he found that his feet were caught, and he was unable to extricate himself, and that he was gradually going to meet a sure and horrible death. He managed to attact the attention of some of his companions, who stopped the machinery just as he was entering the fiery furnace. He was severely scorched before he was rescued from his perilous position.

The French wheat crop of 1880, as estimated by M. Vanden Berghe, an eminent grain merchant, as published by the *Paris Debats*, will show a yield of 97,757,302 hectolitres, or 269,382,580 bushels, from an area of 7,015,353 hectares, or 17,327,921 acres. The average product is placed at 102,546,603 hectolitres, or 282,003,433 bushels. showing that the 1880 crop is slightly under an average amount. It is estimated that the crop will be disposed of as follows: For seed, 14,993.802 hectolitres; public food, 72,000,000; consumption by animals, 4,365.263; industrial purposes, 4,456,760; total, 95,815,825 hectolitres, leaving an apparent surplus of 2,141,477 hectolitres, or 5,889,661 bushels.

About six o'clock on the evening of Oct. 29, a fire broke out in the separator in the upper story of Hon. H. M. Matteson's flouring mill at Faribault, Minn., and notwithstanding the gallant efforts of the firemen the building was totally destroyed. Loss, about $20 000; insurance on mill, machinery, etc., $11,400; on stock, $5,000. The origin of the fire is supposed to have been from a hot journal connected with the machinery in the upper story of the mill and near the dust room. The mill was running, and the fire when first seen was in the upper story, and soon after there was an explosion in the dust room, which immediately enveloped the upper part of the room in flames. The mill will be rebuilt.

Concerning the milling interests of Mankato, Minn., the *Review* says: "The Mankato Mill company, formed of R. D. Hubbard and F. L. Waters, has erected a fine flouring mill seventy-five feet square and five stories high. It is built of red brick, and is a most neat and imposing structure, with warehouse and engine room separate from the main building. It contains all the latest improved machinery, and turns out 500 barrels of flour per day by the Hungarian roller process. In the engine room is located a standing pump which supplies the city with water, there being over three miles of mains laid. W. H. Rockey & Co., in the City mill, grind about 100 barrels per day of straight grades, which is largely used by bakers. The Farmer's mill of W. Clark turns out some forty barrels of good flour, and does a considerable custom business."

The *Fargo Argus* supplies some interesting particulars of the result of this year's operations on the now celebrated Grandin farm in Dakota: "During the season of 1880 the management cultivated 5,921 acres of wheat, the total yield of which amounted to 137,287 bushels, or an average of 23 bushels and 10 pounds to the acre. In addition to this there were 304 acres of oats, which produced 18,925 bushels, and 141 acres of barley, the crop of which was 3,520 bushels. The Grandins will break new land for the next crop to the extent of 2,000 acres, giving a total area for seeding next spring of 8,001 acres. This splendid estate consists of the river wheat farm of 40,000 acres on the Red River of the North, and the stock farm at Mayville, covering 29,000 acres. Total, 69,000 acres. As a slight commentary upon the question, 'Does bonanza farming pay?' it may be mentioned that 37,000 bushels of wheat will pay all the expenses of the institution for the year; the other productions—oats and barley—will feed the stock, and the proceeds of 100,000 bushels of North Dakota No. 1 hard wheat will represent the net profit of the Grandin crop for 1880.

Enemies of the Wheat Plant.

BY REV. C. J. S. BETHUNE.

Read before the Dominion Agricultural Commission.

The most destructive insect pest to the wheat crop is the wheat midge, or *Cecidomyia tritici*, which has been first observed in America in 1820, when it was discovered in the State of Vermont, having been imported, like most of our destructive insects, from Europe. It spread with great rapidity over the Eastern and Central States and Canada, and in 1856 the loss to Canadian agriculturalists from its ravages was estimated at $2,500,000, while in the following year, 1857, it was calculated that 8,000,000 bushels of wheat were destroyed in the Province of Ontario alone. From that time up to 1868 it continued to be very destructive, but since 1869 it has been almost unknown. It is probable that the checking of the midge plague was due partly to a parasite which preyed upon the insect itself, and which was well-known in England and the countries of Europe, though, owing, perhaps, to its extreme minuteness, it had never been detected in this country, and partly to the general introduction of what were known as midge-proof varieties of wheat. Some of these varieties resisted the midge on account of the hardness of the envelope which inclosed the kernel, and some on account of their maturing either before the midge became formidable or after it had ceased to be so. The midge resembles the Hessian fly in appearance, the main difference being that the color of its body is yellow, while that of the Hessian fly is black. It frequents the ripening ears of the grain, and lays its eggs in the blossom of the wheat. As soon as the larvæ are hatched they begin to feed upon the juices of the grain, causing the latter to gradually shrivel up and become useless. When the period of the ripening of the grain arrives, the midge descends into the earth, remaining there throughout the winter. In the following spring it emerges into the pupa state, and in the month of June becomes a perfect insect. It is fond of moisture, and therefore likely to be found in low-lying lands, or lands not thoroughly drained.

The Hessian fly, or *Cecidomyia destructor*, is of older standing on this continent than the midge, its first appearance in America being about the year 1776. It was first observed in Ontario in 1846, and since then has been a very familiar insect, though its ravages have been serious of late years. Although the insect is very similar to the midge, its mode of attack is entirely different. It appears first in the fall of the year at the roots of the plants, lays its eggs, and the larvæ are hatched out and remain in the earth all winter, the brood appearing in the spring. There is a second brood in the spring which attacks the stalk, and it is upon this portion of the plant that the Hessian fly is most commonly observed. There are happily a number of parasites which prey upon this pest, the chief being a species of apis, ichneumons of various kinds, and probably some of what are more properly termed bugs. Spring wheat is not so much affected by this pest as fall wheat, as the grain ripening the same season in which it is sown affords no place for the larvæ to hibernate during the winter. This fact would point out as a remedy for the Hessian fly the abandonment for a time of the cultivation of fall wheat, and the substitution of spring wheat. Another remedy would be the sowing of fall wheat as late as practicable in the fall, in order that the larvæ might not find the plant sufficiently advanced for its attacks at the root before the winter sets in. Thorough cultivation would also aid in lessening the damage done by this pest, as the stronger and more healthy the plant, as a matter of course, the less it would suffer from the ravages of the fly.

The chinch bug, or *Micropus leucopterous*, might be called the most powerful insect foe of the United States agriculturist, but it has never been known to be destructive in Canada. Our proximity to the States, however, renders us liable to an invasion by this plague, and there is nothing except a slight difference in climate that would warrant the belief that it would not thrive in this country. It is an insect that requires heat and drought, to long-continued spells of which the Western States are much more subject than the older provinces of Canada. There is, however, great danger of its importation from Minnesota into Manitoba, where the climate conditions are very similar. It has been seen in Canada, and in 1866 the writer published a description of it in the *Canada Farmer*, from specimens which had been forwarded to him from Grimsby. It attacks other grains besides wheat, and, like many other insect pests, it is hibernating, existing throughout the winter in its perfect state. In the Western States, where it is abundant, there are a great number of broods during the year. One of the remedies used is the application of water. A heavy thunderstorm during the seasons of its ravages is worth millions of dollars to the farmers of the Western States. It attacks the heads of the grain, clustering round them, and extracting their juices by means of its proboscis. A number of the larger carnivorous insects prey upon this creature, such as the lady-bird, the lace-winged fly, and the syrphus fly.

The same parasites are useful in this case as in the case of the grain fly, or *Aphis avenæ*. This latter belongs to the widely distributed family of *aphidæ*, or plant lice, which were so destructive to flowers grown in conservatories, windows, etc., and were consequently well known to everybody. The ravages of the grain aphis were never so serious as to give cause for alarm, though in 1861 it was quite a plague to the farmers of the Province, but it has not been very destructive since. Its diminition was attributable to the parasites which he had already mentioned as preying upon this insect in common with the chinch bug. Thunderstorms also wash off and kill large quantities, as they have no means of regaining their position on the plant.

The joint worm, or *Isosoma horder*, is especially injurious to barley, but it is not common in America, though in 1866 and 1867 it was somewhat prevalent in Ontario. It attacks the grain near the second joint, and the result of its work is to raise a gall or excrescence somewhat like a joint, hence its name. It does not attack the ear. The best artificial mode of dealing with it is to burn the stubble of the grain infested by it.

The army worm, *Hancania unipuncta*, is much more common in the United States than in Canada, and receives its name from the fact that it assembles in large numbers when its food is exhausted in any particular locality and moves away in search of fresh supplies. New Brunswick was lately visited by this pest in such numbers as to put a stop to railway trains through the quantities slaughtered on the tracks, but they have never yet visited Ontario in anything like considerable numbers. A good way to meet this approach is to dig a deep trench and allow them to accumulate in it, afterward covering them with straw or shavings and setting the trench on fire. A number of parasites, both of the ichneumon and beetle kind prey upon the army worm.

The wire worm, or *Agriotes mancus*, is sometimes very troublesome to wheat. It receives its name from the fact that it is a long, slender grub; it attacks the root of the plant underground, and is consequently seldom observed by the farmer. It is sometimes seen in plowing, and where it is observed, a good plan would be to have children follow the plow and gather the insects up and destroy them. Turkeys and ducks also eat them.

The British Labor Market.

The labor market continues, on the whole, to show steady progress. Both the iron and coal trades in the leading centres are well employed. In the North of England, though the price of iron is lower, the wages, under sliding-scale arrangement, are not effected. At Wigan the mines are still unsettled, but generally there are few important strikes to record. At Bradford, the long engineers' strike is now over. At most of the ports iron shipbuilding and marine engineering remain brisk, and steel rail makers are equally well employed at Sheffield, Newport and elsewhere. The reopening of the Rosedale iron-stone mines is announced, and an improvement in the Staffordshire potteries may be noted. At Birmingham the hardware trades are quiet, and the nail trade remains very depressed. Lamp makers are somewhat better employed. In the textile trades a somewhat more settled condition prevails. At Leicester trade is improving, and at Dundee there is also an upward movement. Several sections of railway servants are now asking for a rise in wages, consequent on increasing traffic. Trade in the United States continues good, and the emigration from the United Kingdom remains high. It is again stated that arrangements for the Canadian Pacific Railway construction have been made. Recent advices from Fiji indicate that the local industries are making progress, and there is less difficulty in getting labor.—*Labour News.*

WHY A PUMP WILL NOT LIFT HOT WATER.—The suction pump depends for its action on atmospheric pressure. When the piston of such a pump is raised a vacuum is formed beneath it, and the water from the well or reservoir is forced to follow the piston up to the top of its stroke by the atmospheric pressure on the water surface with which the pump is connected. When the attempt is made to lift very hot water, however, the rise of the piston causes an abundant evolution of steam or vapor from the water surface, which fills the space beneath the piston. This steam or vapor has considerable tension, and exerts a sufficient back pressure to counterbalance and equalize the atmospheric pressure. On this account, the lifting of hot water, save for very small lifts, is impossible. When hot liquids are to be pumped, therefore, the point of supply should not be below the pump, but rather a little above it, so that the liquid may flow into it.—*The Manufacturer and Builder.*

Chicago and Milwaukee "bucket shops" and their branches in the interior, have collapsed during the past month.